

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII

901 N. 5TH STREET

KANSAS CITY, KANSAS 66101

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ENVIRONMENTAL PROTECTION
AGENCY-REGION VII
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In the Matter of:

Columbus Former Manufactured Gas
Plant Site

Columbus, Nebraska

Centel Corporation,

And

Aquila, Inc.,

Respondents.

Proceedings under Sections 104, 107 and 122
of the Comprehensive Environmental
Response, Compensation, and Liability Act of
1980 (42 U.S.C. §§ 9604, 9607 and 9622).

Docket No. CERCLA-07-2003-0307

ADMINISTRATIVE ORDER ON
CONSENT

ADMINISTRATIVE ORDER ON CONSENT FOR
REMOVAL SITE EVALUATION FOR THE SOURCE OF
CONTAMINATION AND BASELINE RISK ASSESSMENT

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I. INTRODUCTION

1. This Administrative Order on Consent for Removal Site Evaluation for the Source of Contamination and Baseline Risk Assessment ("Order") is entered into by the United States Environmental Protection Agency ("EPA") and Respondents: Centel Corporation ("Centel") and Aquila, Inc. ("Aquila"). This Order requires the performance of a removal site evaluation for the source of manufactured gas plant ("MGP") related contamination ("RSE") and, if necessary, a baseline risk assessment pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300, at the Columbus Former Manufactured Gas Plant ("FMGP") Site (the "Site"), which is located in the City of Columbus, Platte County, Nebraska.

2. This Order also calls for reimbursement of Oversight Costs incurred by EPA as set forth in Section XVIII (Reimbursement of Costs).

II. JURISDICTION

3. This Order is issued pursuant to the authority vested in the President of the United States by Sections 104, 107 and 122 of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, 42 U.S.C. §§ 9604, 9607, and 9622 ("CERCLA"). This authority was delegated to the Administrator of EPA on January 23, 1987, by Executive Order 12580, 52 Fed. Reg. 2926 (1987), and was further delegated to the Regional Administrators on September 13, 1987, by EPA Delegation No. 14-14-C. This authority was subsequently delegated to the Director, Superfund Division, by EPA Region VII Delegation No. R7-14-14C, dated January 1, 1995.

4. Respondents' participation in this Order shall not constitute or be construed as an admission of liability or of the findings or determinations contained in this Order. Respondents agree to comply with and be bound by the terms of this Order. Respondents consent to and agree

not to contest EPA's authority or jurisdiction to issue or to enforce this Order. Respondents further agree not to contest in any proceeding brought by the United States to enforce this Order, the basis or validity of this Order or any of its terms.

5. EPA has notified the State of Nebraska of the issuance of this Order.

III. DEFINITIONS

6. Unless otherwise expressly provided herein, terms used in this Order that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in the statute or its implementing regulations. Whenever terms listed below are used in this Order or in the documents attached to this Order or incorporated by reference into this Order, the following definitions shall apply:

- a. "Day" shall mean a calendar day unless expressly stated to be a working day. "Working day" shall mean any day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the end of the next Working day.

- b. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300 et seq., as amended.

- c. "Order" shall mean this Administrative Order on Consent for Removal Site Evaluation for the Source of MGP Contamination and Baseline Risk Assessment and all appendices attached hereto. In the event of conflict between this Order and any provision of any previous agreement, order or writing, the terms and conditions of this Order shall control.

d. "Oversight Costs", as defined solely under this Order, shall mean all direct and indirect costs incurred by EPA in connection with this Consent Order, including, but not limited to, time and travel costs of EPA personnel and associated indirect costs; contractor costs; interagency agreement costs; compliance monitoring including the collection and analysis of split samples, Site visits, discussions regarding disputes that may arise as a result of this Consent Order, review and approval or disapproval of reports and other costs incurred in implementing, overseeing, or enforcing this Consent Order. "Oversight Costs" do not mean costs incurred by the United States in performing the Work, if EPA performs the Work pursuant to Paragraphs 24 or 59 of this Consent Order.

e. "Paragraph" shall mean a portion of this Order identified by an Arabic numeral, a letter of the alphabet or a lower case Roman numeral.

f. "Parties" shall mean the United States and the Respondents.

g. "RCRA" shall mean the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act and the Hazardous and Solid Waste Amendments, 42 U.S.C. § 6901 et seq.

h. "Section" shall mean a portion of this Order identified by a Roman numeral and includes one or more paragraphs, unless used to refer to a statutory or regulatory section.

i. "Site" shall mean the Columbus Former Manufactured Gas Plant ("FMGP") Site, which is located at 1169 22nd Avenue, Columbus, Nebraska; as depicted generally in Attachment 1 of this Order.

j. "United States" shall mean the United States of America, and any and all agencies and instrumentalities thereof.

k. "Work" shall mean all activities Respondents are required to perform under this Order.

IV. STATEMENT OF PURPOSE

7. This Order requires the Respondents to perform a RSE and, if necessary, a Baseline Risk Assessment consistent with the NCP, 40 C.F.R. Part 300. The purpose of the Order is: to conduct a RSE to investigate and characterize the source of MGP contamination at the Site; and, if necessary, to conduct a baseline risk assessment of the risks, if any, the Site poses to human health and the environment. The scope and substance of the RSE and Baseline Risk Assessment to be performed by Respondents is set forth in Section VIII (Work to be Performed) of this Order and in the Work Plan (January, 2004 Removal Site Evaluation Work Plan), incorporated herein as Attachment 2 to this Order.

V. FINDINGS OF FACT

8. The Columbus FMGP Site is located at 1169 22nd Avenue, in the City of Columbus, Platte County, State of Nebraska. The Site is described in Attachment 1 of this Order.

9. The Site is on approximately one-half acre, in a mixed residential, commercial, and industrial use area. To the south and east are residential properties, to the north are railroad tracks, and to the west light industrial property. The Site is fenced, with on-site buildings, and is used by Aquila, Inc., the current property owner, for limited storage purposes.

10. The Site is located within the larger geographic boundary of a groundwater plume contaminated with perchlorethylene ("PCE") at the level of 5-100 ug/L. This PCE contamination, unrelated to the former MGP at the Site, is the subject of an ongoing EPA

cleanup in Columbus, Nebraska ("10th Street Site"). The 10th Street Site involves releases from various historic and current drycleaner operations in Columbus, Nebraska. These releases threaten to affect the City of Columbus drinking water wells. The EPA prepared a Record of Decision for the 10th Street Site which contemplates the installation of up to four wells to divert the direction of the flow of and to remove the PCE.

11. A manufactured gas plant was owned and operated at the Site by Columbus Gas Company from approximately 1908 to 1927, and by Central West Public Service Company from 1927 until approximately 1932 when the manufactured gas plant operations ceased. Hazardous substances that may be present on-site include those typically associated with manufactured gas plants, such as polynuclear aromatic hydrocarbon ("PAH") constituents.

12. On July 27, 1927, the owner and operator of the manufactured gas plant at the Site, Columbus Gas Co., sold the Site to Central West Public Service Co., which continued to operate the manufactured gas plant until approximately 1932. In 1934, Central West Public Service Co. was reorganized in bankruptcy and all of its assets, including the Site, were sold to Central Electric & Telephone Co. On July 27, 1944, Central Electric & Telephone Co. restructured and changed its name to Central Electric & Gas Co. On May 1, 1961, Central Electric & Gas Co. changed its name to Western Power & Gas Co. In 1968 Western Power & Gas Co. changed its name to Central Telephone & Utilities Corp. On September 8, 1976, Central Telephone & Utilities Corporation recorded its corporation warranty deed of the Site to Minnesota Gas Co., also known as Minnegasco. In 1982, Central Telephone & Utilities Corp. changed its name to Centel Corp. On February 1, 1993, the successor to Minnegasco, Arkla, Inc., sold the Site to Peoples Natural Gas Company. Aquila, Inc., is a successor to Peoples Natural Gas Company. Respondent Centel Corp. is a corporation organized under the laws of

the State of Kansas, and Respondent Aquila, Inc. is a corporation organized under the laws of the State of Delaware.

13. Soil sampling conducted at the Site in 1991 and 1992 indicates the existence of certain hazardous substances at levels that may be above background. These substances include polynuclear aromatic hydrocarbon ("PAH") compounds.

14. Effective May 12, 2003, Respondent Centel entered into an Administrative Order on Consent for Removal Site Evaluation for Groundwater, for the Columbus, Nebraska, Former Manufactured Gas Plant Site, Docket No. CERCLA-07-2003-0149, and on October 1, 2003 had completed the work required under that order.

VI. CONCLUSIONS OF LAW AND DETERMINATIONS

15. The Site is a "facility" as defined at Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

16. The substances found at the Site and identified in the Findings of Fact above, include "hazardous substances" as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

17. The conditions at the Site constitute an actual or threatened release of hazardous substances into the environment at the Site, as defined in Sections 101(8) and (22) of CERCLA, 42 U.S.C. §§ 9601(8) and (22).

18. Respondents are each within the meaning of "person" as defined by and within the meaning of Sections 101(21) and 107(a)(3) of CERCLA, 42 U.S.C. §§ 9601(21) and 9607(a)(3).

19. Respondents are each a liable person under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a).

20. EPA is authorized to act pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, to investigate the existence and extent of the release or threat of release at the Site, the source and nature of the hazardous substances, pollutants or contaminants involved, and the extent of danger to the public health and welfare and the environment.

21. The Work required under the terms of this Order is in the public interest and if carried out in conformance with the requirements of this Order will be consistent with the National Contingency Plan, 40 C.F.R. Part 300, et seq.

VII. PARTIES BOUND

22. The terms of this Order shall apply to and be binding upon Respondents and their respective successors and assigns. The signatories to this Order certify that they are authorized to execute and legally bind the parties they represent to this Order.

23. No change in the ownership, corporate or partnership status of Respondents or of the Site shall alter the responsibilities of Respondents under this Order. Respondents shall be responsible for any noncompliance with this Order. Respondents shall ensure that their contractors, subcontractors, laboratories, consultants, and employees performing the Work receive a copy of, and comply with this Order.

VIII. WORK TO BE PERFORMED

24. Respondents have designated Black and Veatch Corporation as the contractor who will perform the Work required by this Order on behalf of the Respondents. Respondents shall notify EPA of the name and qualifications of any other contractors or subcontractors retained to perform Work under this Order at least ten (10) days prior to commencement of such Work. The qualifications of all contractors and laboratories shall be subject to EPA review and approval. EPA will provide a notice of disapproval of any person or laboratory identified by Respondents or provide an authorization to proceed. If EPA disapproves in writing of the

qualifications of such firm or person(s), Respondents shall notify EPA of the identity and qualifications of a replacement within (30) days of receipt of EPA's written notice. EPA will thereafter provide a notice of disapproval or an authorization to proceed. If EPA subsequently disapproves of the replacement, it will so notify Respondents in writing. EPA shall not unreasonably disapprove of any contractor, person or laboratory proposed by Respondent. In the event EPA determines that Respondents have ceased material implementation of any portion of the Work, is seriously or repeatedly deficient or late in their performance of the Work, or is implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may terminate this Order and/or assume the performance of all or any portion of the Work as EPA determines necessary. Respondents may invoke the procedures set forth in Section XIX (Dispute Resolution) to dispute EPA's determination that takeover of the Work or termination of this Order is warranted under this Paragraph. Costs incurred by the United States in performing the Work if EPA performs the Work pursuant to this Paragraph shall not be considered Oversight Costs incurred by EPA that Respondents shall pay pursuant to Section XVIII (Reimbursement of Costs). Notwithstanding any other provision of this Order, EPA retains all authority and reserves all rights to take any and all response actions authorized by law and to pursue recovery of the costs incurred by the United States in performing the Work if EPA takes over the Work.

25. EPA has designated William Bunn as its Project Coordinator. Respondents shall direct all submissions required by this Order to Mr. Bunn at the United States Environmental Protection Agency, Region VII, 901 North 5th Street, Kansas City, Kansas 66101, (913) 551-7792.

26. Respondents have designated Jeff Adkins as its Project Coordinator. All notices and correspondence relating to this Order shall be directed to Jeff Adkins at 6480 Sprint Parkway, Mailstop KSOPHM0516-5B826, Overland Park, Kansas, 66251; telephone number (913) 315-8626.

27. EPA and Respondents shall have the right to change their designated Project Coordinators and contractors. To the extent practicable, verbal notice of such change shall be provided to the other parties within forty-eight (48) hours of such change and written notice shall follow within five (5) working days of such change.

28. Respondents shall conduct activities and submit deliverables as set forth below. All such work shall be conducted in accordance with CERCLA, the NCP, and the EPA guidance listed in Attachment 3. All work performed under this Order shall be completed in accordance with this Order and the Work Plan approved and attached as Attachment 2.

29. Respondents are hereby ordered to conduct a RSE and, if necessary, a Baseline Risk Assessment, in accordance with Attachment 2 and this Order pursuant to the National Contingency Plan, 40 C.F.R. Part 300, et seq., and this Order.

30. Respondents shall notify EPA at least ten (10) working days prior to performing any on-site Work pursuant to the Work Plan approved by EPA, or such other time as the parties agree. Respondents shall submit to EPA analytical data within fourteen (14) days of validation of such data, in a form that shows the location, medium, and results of each sample.

31. EPA shall notify Respondents whether a Baseline Risk Assessment is required within fourteen (14) days after validated data has been received from the RSE Field Activities. EPA's determination as to whether a Baseline Risk Assessment is required shall not be subject to the dispute resolution process set forth in Section XIX of this Order. Failure by EPA to timely

notify Respondents that a Baseline Risk Assessment is required will toll the submittal date for the RSE Report and Baseline Risk Assessment under Paragraph 32 by the number of days said notification is untimely.

32. Respondents will submit the RSE Report within 90 days after complete validated data from the RSE has been provided to EPA by Respondents. Subject to Paragraph 31, Respondents will submit a Baseline Risk Assessment within 90 days after validated data from the RSE has been provided by Respondents to EPA.

33. Beginning with the first full month following the effective date of this Order, Respondents shall provide to EPA monthly written progress reports by the 15th day of the following month. The Parties may lengthen the intervals for progress reports by mutual agreement pursuant to Section XXIX (Modifications). With respect to the preceding month, these progress reports shall:

- a. describe the actions which have been taken to comply with this Order during that month;
- b. describe work planned for the next two (2) months with schedules relating such work to the overall project schedule for work completion under this Order; and
- c. describe all problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual anticipated problems or delays.

34. Upon submittal and EPA's approval of the RSE Report and, if necessary, any Baseline Risk Assessment, pursuant to Section XXIX (Notice of Completion), the Work to be performed by Respondents under this Order shall be complete.

IX. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

35. If any action or occurrence arising from the performance of the Work causes or threatens to cause an additional release of hazardous substances from the Site or an endangerment to the public health, welfare, or the environment, Respondents shall immediately take all appropriate action, in accordance with all applicable provisions of CERCLA, the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §§ 11001-11050 ("EPCRA") and the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release.

36. If any action or occurrence arising from the performance of the Work causes a release of a hazardous substance at or from the Site occurs in a quantity requiring notification under CERCLA and/or EPCRA, Respondents shall immediately notify EPA's Project Coordinator and the National Response Center at telephone number (800) 424-8802. Respondents shall submit a written report to EPA within seven (7) days after each such release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release.

X. QUALITY ASSURANCE

37. All sampling and analysis activities undertaken as part of this Order shall be conducted in accordance with the EPA approved QAPP. Respondents shall ensure that the laboratory used to perform analyses under this Order participates in a QA/QC program that complies with documents set out in Attachment 3. Respondents shall include in their contracts with all laboratories and personnel utilized for sample collection and analysis and other field work a provision allowing EPA representatives access to such laboratories and personnel for auditing purposes.

38. Upon request by EPA, Respondents shall allow EPA or its authorized representatives to take split or duplicate samples of any samples collected by Respondents while performing Work pursuant to this Order, and/or shall receive and analyze performance evaluation samples provided by EPA. EPA shall have the right to take any additional samples that it deems necessary.

XI. SUBMISSIONS REQUIRING EPA APPROVAL

39. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Order, EPA shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) disapprove, in whole or in part, the submission, with a written statement providing the basis for disapproval and notice to Respondents to modify the submission; or (d) any combination of the above.

40. Upon EPA approval or approval upon specified conditions by EPA, Respondents shall proceed to take any action required by the plan, report, or other item.

41. Upon receipt of a notice of EPA disapproval, Respondents shall within thirty (30) calendar days (or such additional time as specified by EPA in such notice) resubmit the item for approval addressing EPA's comments. If a resubmitted plan, report or other item, or portion thereof, is disapproved by EPA, EPA shall provide written notice of such disapproval and the basis therefor. EPA retains the right to amend or develop the plan, report, or other item. Respondents shall implement any such plan, report or item as amended or developed by EPA. Any decisions by EPA pursuant to this section are subject to Dispute Resolution.

42. Notwithstanding the receipt of a notice of disapproval, Respondents shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not necessarily relieve Respondents of any liability for stipulated penalties under this Order.

43. If upon resubmission, Respondents have a plan, report or other item disapproved or modified by EPA, Respondents may be deemed by EPA to have failed to submit such plan, report, or item unless Respondents invoke the dispute resolution procedures set forth in Section XIX and EPA's action is overturned pursuant to that Section. The provisions of Section XIX (Dispute Resolution) and Section XXI (Stipulated Penalties) shall govern the implementation of the Work required under this Order, and accrual and payment of any stipulated penalties during dispute resolution. If EPA's disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XXI (Stipulated Penalties); however, stipulated penalties shall not accrue with respect to a resubmission that is disapproved or modified by EPA, during the period, if any, beginning on the 31st day after EPA's receipt of such resubmission until the date that EPA notifies Respondents of any disapproval or modification.

44. All plans required to be submitted to EPA under this Order shall, upon approval or modification by EPA, be enforceable under this Order. If EPA approves or modifies a portion of a plan required to be submitted to EPA under this Order, the approved or modified portion shall be enforceable under this Order.

XII. ACCESS TO PROPERTY AND INFORMATION

45. At all reasonable times, EPA and its authorized representatives may, upon presenting credentials, enter and freely move about all property at the Site and where Work required hereunder is being performed for the purposes of inspecting conditions, activities, the results of activities, records, operating logs, and contracts related to the Site or Respondents and their contractor(s) pursuant to this Order; reviewing the progress of Respondents in carrying out the terms of this Order; conducting tests as EPA or its authorized representatives deem necessary; using a camera, sound recording device or other documentary type equipment; and

verifying the data submitted to EPA by Respondents. Respondents shall allow these persons to inspect and copy all records, files, photographs, documents, sampling and monitoring data and other writings related to the Work undertaken in carrying out this Order. Nothing herein shall be interpreted as limiting or affecting EPA's right of entry or inspection authority under federal law.

46. Nothing herein shall be interpreted as limiting or affecting Respondents' rights to preserve the confidentiality of attorney work product or attorney-client communications. However, no documents that Respondents are required by this Order to prepare shall be withheld on the grounds that they are privileged. No claim of confidentiality shall be made with respect to any monitoring or sampling data, hydrogeologic or geologic data or any groundwater monitoring data generated pursuant to this Order.

47. To the extent that Work required by the Work Plan must be done on property not owned or controlled by Respondents, Respondents shall use their best efforts to obtain site access agreement(s) from the present owner(s) of such property within thirty (30) days of the effective date of this Order. To the extent that Additional Work must be done on property not owned or controlled by Respondents, Respondents shall use their best efforts to obtain site access agreement(s) from the present owner(s) of such property within thirty (30) days of the date of Respondents' receipt of written notice by the EPA that such access is required. Such agreements shall provide access for EPA, its authorized representatives, and the Respondents and their authorized representatives. As used in this paragraph, best efforts includes an offer of consideration in exchange for access. In the event that any such access agreement is not obtained within this time period, Respondents shall notify EPA in writing of the lack of access, the efforts it made to obtain access, and an explanation of the bases therefor, e.g., inability to locate the current owner of the property, lack of response to a request for access, or denial of

access. In the event EPA obtains access, Respondents shall undertake Work on such property in accordance with the approved Work Plan and also shall reimburse EPA for all costs and attorney fees incurred by the United States in obtaining access where EPA determines that Respondents did not use their best efforts to obtain site access agreement(s) as set forth in this Order. Respondents shall perform all other activities not requiring access to that property.

XIII. RECORD RETENTION, DOCUMENTATION, AND AVAILABILITY OF INFORMATION

48. Respondents shall preserve all documents and information relating to Work performed under this Consent Order, or relating to the hazardous substances found on or released from the Site, for ten (10) years following completion of the Work required by this Consent Order. Only one copy of identical documents needs to be retained. Drafts or documents that are subsequently prepared in final form need not be retained in addition to the final document. If, during such ten year period, EPA requests, in writing, a review of, or copies of, any such documentation or information, Respondents shall provide the original or copies of such documents or information to EPA within fifteen (15) working days. At the end of this ten year period and thirty (30) days before any document or information is destroyed, Respondents shall notify EPA that such documents and information are available to EPA for inspection, and upon request, shall provide the original or true and accurate copies of such documents and information to EPA.

XIV. OFF-SITE SHIPMENTS

49. Any hazardous substances, pollutants or contaminants removed off-site pursuant to this Order for treatment, storage or disposal shall be treated, stored, or disposed of at a facility in compliance, as determined by EPA, with the EPA Off-Site Rule, 40 C.F.R. § 300.440, promulgated pursuant to 42 U.S.C. § 9621(d)(3).

XV. COMPLIANCE WITH OTHER LAWS

50. All actions required pursuant to this Order shall be performed in accordance with all applicable local, state, and federal laws and regulations except as provided in CERCLA Section 121(e), 42 U.S.C. § 9621, and 40 C.F.R. § 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all Work required pursuant to this Order shall, to the extent practicable, as determined by EPA, attain applicable or relevant and appropriate requirements ("ARARs") under federal environmental, state environmental, or facility siting laws.

XVI. AUTHORITY OF EPA'S PROJECT COORDINATOR

51. EPA's Project Coordinator shall be responsible for overseeing the implementation of this Order. EPA's Project Coordinator shall have the authority vested in a Remedial Project Manager ("RPM") and an On-Scene Coordinator ("OSC") by the NCP, including the authority to halt, conduct, or direct any Work required by this Order, or to direct any other response action undertaken by EPA or Respondents at the Site. Absence of EPA's Project Coordinator from the Site shall not be cause for stoppage of Work unless specifically directed by EPA's Project Coordinator.

XVII. ADDITIONAL WORK

52. If EPA determines that additional sampling, analysis, or reporting, or other tasks not included in the attached Work Plan are necessary to achieve the purpose of this Order, EPA will notify Respondents of that determination. Unless otherwise stated by EPA, within thirty (30) days of receipt of notice from EPA that such additional sampling, analysis, reporting or other tasks are necessary, Respondents shall submit for review and approval by EPA a supplemental work plan for the additional sampling, analysis, reporting or other tasks. Upon EPA's approval of the supplemental work plan, Respondents shall implement such approved supplemental work plan in accordance with the provisions and schedule contained therein.

EPA's notice to Respondents of the need for additional work pursuant to this Section is subject to Section XIX (Dispute Resolution) of this Order and any delay in performing such additional work resulting from Respondent's exercise of their right to dispute any EPA notice of additional work issued pursuant to this Section shall not be subject to stipulated penalties pursuant to Section XXI (Stipulated Penalties).

XVIII. REIMBURSEMENT OF COSTS

53. EPA shall periodically submit to Respondents a bill for Oversight Costs and a reconciled Regional Itemized Cost Summary which shall serve as the basis for the payment demand. EPA's reconciled Regional Itemized Cost Summary shall include the following information:

- a. EPA's payroll costs, including the names of the individuals charging time to the Site, the pay periods in which each individual charged time to the Site, the number of hours charged by each individual per pay period, and the payroll cost per individual per pay period;
- b. EPA's travel costs, including the names of the individuals charging travel costs to this Site and the date and amount of payment of each travel claim charged to the Site;
- c. EPA's indirect costs charged for regional staff time, including the individual's name, pay period, the number of hours per pay period, the indirect cost rate, and total indirect cost;
- d. Contract costs, including for each such payment the amount paid, the date paid, and invoice number; and
- e. The amount and date paid for other costs.

The reconciled Regional Itemized Cost Summary provided by EPA shall serve as the basis for payment demands. Additional cost documentation will not be provided as a matter of course; but may be provided if a dispute arises about a particular cost item.

54. Respondents shall, within forty-five (45) days of receipt of the bill, remit a cashier's or certified check for the amount of the bill made payable to the "Hazardous Substance Superfund," to the following address:

Mellon Bank
EPA Region VII
(Comptroller Branch)
P.O. Box 360748M
Pittsburgh, Pennsylvania 15251

Respondents shall simultaneously transmit a copy of the check to EPA's Project Coordinator. Payments shall reference the payor's name and address, the EPA site identification reference "3K", and the docket number that appears on the face of this Order.

55. If EPA does not receive payment of a billing within forty-five (45) days after Respondents' receipt of the bill, Respondents shall pay interest on the unpaid balance. Interest is established at the rate specified in Section 107(a) of CERCLA, 42 U.S.C. § 9607(a). The interest on response costs shall begin to accrue forty-five (45) days after Respondents' receipt of the bill. Interest shall accrue at the rate specified through the date of the payment. Payments of interest made under this paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondents' failure to make timely payments under this Section.

56. Respondents may dispute all or part of a bill for Oversight Costs submitted under this Order, if Respondents allege that EPA has made an accounting error, or if Respondents allege that a cost item is inconsistent with the NCP.

57. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondents shall pay the full amount of the uncontested costs into the Hazardous Substances Superfund as specified above on or before the due date. Within the same time period, Respondents shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondents shall simultaneously transmit a copy of each check to EPA's Project Coordinator. Respondents shall ensure that the prevailing party or parties in the dispute receives the amount upon which they prevailed from the escrow account plus interest within thirty (30) days after the dispute is resolved.

XIX. DISPUTE RESOLUTION

58. If Respondents disagree, in whole or in part, with any EPA disapproval or other decision or directive made by EPA pursuant to this Order, Respondents shall notify EPA in writing of the objections and the bases for such objections, within fifteen (15) working days of receipt of EPA's disapproval, decision, or directive. Such notice shall define the dispute and state the basis of Respondents' objections. EPA and Respondents shall then have thirty (30) days from EPA's receipt of Respondents' objections to attempt in good faith to resolve the dispute. This thirty (30) day period may be extended upon agreement by the parties.

59. If an agreement is not reached within thirty (30) days, or such other time as agreed to by the Parties, Respondents may, within ten (10) days following the end of the negotiation period, request a decision by the Director of EPA Region VII's Superfund Division. The Division Director shall provide a written statement of his decision and the basis therefor, in accordance with the terms of this Order. Respondents shall proceed in accordance with the Director's decision regarding the matter in dispute regardless of whether Respondents agree with the decision. The question of whether or in what amounts Respondents will be liable for

stipulated penalties shall be resolved by the Division Director taking into account Respondents' good faith in invoking Dispute Resolution. If Respondents do not perform the Work in accordance with the Director's decision, EPA reserves its right to conduct the Work itself, to seek reimbursement from Respondent, to seek enforcement of the decision, to seek stipulated penalties, and/or to seek any other appropriate relief. Costs incurred by the United States in performing the Work if performed by EPA pursuant to this Paragraph shall not be considered Oversight Costs incurred by EPA that Respondents shall pay pursuant to Section XVIII (Reimbursement of Costs).

60. The existence of a dispute as defined herein and EPA's consideration of such matters as placed in dispute shall not excuse, toll or suspend any compliance obligation or deadline required pursuant to this Order except those directly affected by the matter(s) in dispute during the pendency of the dispute resolution process unless mutually agreed upon (except as to a dispute which is resolved in Respondents' favor) or unless otherwise excused, tolled or suspended by EPA Region VII's Superfund Division Director. Stipulated penalties shall accrue from the first day of non-compliance by Respondent, and shall continue to accrue during dispute resolution procedures until twenty (20) days after Respondents requested a determination by the Superfund Division Director pursuant to Paragraph 59 herein, after which date stipulated penalties shall stop accruing until issuance by the Superfund Division Director of a decision resolving the dispute. For Paragraph 65.d. only, the stipulated penalties shall accrue from the first day of non-compliance by Respondents and shall continue until Respondents invoke dispute resolution pursuant to Paragraph 58, after which date stipulated penalties shall stop accruing until resolution of the dispute by the parties or issuance by the Superfund Division Director of a decision resolving the dispute. Stipulated penalties shall continue to accrue during the dispute

resolution process for all matters unrelated to the contested matters at issue in the dispute resolution process. Notwithstanding any other provision of this Order, the EPA may, in its discretion, waive any portion of stipulated penalties that have accrued pursuant to this Order.

61. Notwithstanding any other provision of this Order, no action or decision by EPA pursuant hereto shall constitute final agency action giving rise to any rights to judicial review prior to EPA's initiation of judicial action to compel Respondents' compliance with this Order.

XX. FORCE MAJEURE

62. Respondents agree to perform all requirements of this Order within the time limits established by this Order, unless the performance is prevented or delayed by events which constitute a force majeure. For purposes of this Order, a force majeure is defined as any event arising from causes beyond the reasonable control of Respondents or their consultants, contractors, subcontractors or agents, that delays or prevents performance of any obligation under this Order, despite Respondents' best efforts to fulfill the obligation. Force majeure does not include financial inability to complete the Work, unanticipated or increased costs of performance, normal precipitation events, changed economic circumstances or failure to obtain federal, state or local permits (unless full and complete applications have been timely submitted and Respondents have taken all other actions required to obtain the permit), but may include, as determined by EPA, strikes, lockouts or industrial disputes.

63. Respondents shall notify EPA orally within forty-eight (48) hours after the event, and shall also notify EPA in writing within five (5) days after Respondents become aware of events that constitute a force majeure. Such notice shall: identify the event causing the delay or anticipated delay; provide an estimate of the anticipated length of delay, including necessary demobilization and remobilization; state the measures taken or to be taken to minimize delay; and state the estimated timetable for implementation of these measures. Respondents shall take

all reasonable measures to avoid and minimize the delay. Failure to comply with the notice provision of this Section may constitute a waiver of any claim of force majeure by Respondent.

64. If EPA determines that a delay in performance of a requirement under this Order is or was attributable to a force majeure, the time period for performance of that requirement shall be extended as deemed necessary by EPA, taking into account the length of the delay and any remobilization requirements. Such an extension shall not alter Respondents' obligation to perform or complete other tasks required by the Order which are not directly affected by the force majeure.

XXI. STIPULATED PENALTIES

65. Unless there has been a written modification of a compliance date by EPA, an excusable delay as defined under Section XX (Force Majeure), or a pending dispute resolution matter pursuant to Section XIX (Dispute Resolution), Respondents shall pay stipulated penalties for failure to meet any requirement of this Order, as set forth below. Compliance by Respondents shall include completion of an activity under this Order or a plan approved under this Order or completion of any other matter under this Order in an acceptable manner and within the time schedules specified and approved in the Work Plan.

a. For failure to submit to EPA any submittal (except the progress reports called for in Section VIII (Work to be Performed)) required by this Order, including the attached Work Plan:

- (1) \$150 per day for the first through seventh days of noncompliance;
- (2) \$250 per day for the eighth through the thirtieth days of noncompliance; and
- (3) \$500 per day for the thirty-first day and each succeeding day of noncompliance thereafter.

b. For failure to submit a progress report as required in Section VIII (Work to be Performed) above, as required:

- (1) \$50 per day for the first through seventh days of noncompliance;
- (2) \$100 per day for the eighth through the thirtieth days of noncompliance and;
- (3) \$150 per day for the thirty-first day and each succeeding day of noncompliance thereafter.

c. For material failure to complete the Work specified in the attached Work Plan as required:

- (1) \$250 per day for the first through seventh days of noncompliance;
- (2) \$500 per day for the eighth through the thirtieth days of noncompliance and;
- (3) \$1,000 per day for the thirty-first day and each succeeding day of noncompliance thereafter.

d. For failure to pay Oversight Costs as required in Section XVIII (Reimbursement of Costs) above:

- (1) \$250 per day for the first through seventh days of noncompliance;
- (2) \$500 per day for the eighth through the thirtieth days of noncompliance and;
- (3) \$1,000 per day for the thirty-first day and each succeeding day of noncompliance thereafter.

66. Except as set forth in Paragraph 60 and Paragraph 43, all penalties shall begin to accrue on the date that complete performance is due or a violation occurs and shall continue to

accrue through the final day of correction of the noncompliance. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Order. EPA may waive its right to assess stipulated penalties under this Order.

67. Except for those penalties that are the subject of dispute pursuant to Section XIX (Dispute Resolution) herein, all penalties owed under this Section shall be due within forty-five (45) days of receipt by Respondents of written demand by EPA for payment thereof. Interest shall begin to accrue on the unpaid balance at the end of this forty-five (45) day period. Interest will accrue on the unpaid balance until such penalties and interest have been paid in full and will be compounded annually.

68. All penalties shall be paid by certified or cashier's check made payable to "Treasurer of the United States", and shall be remitted to:

Mellon Bank
EPA Region VII
(Comptroller Branch)
P.O. Box 360748M
Pittsburgh, PA 15251

All payments shall reference Respondents' names and addresses, the EPA Docket Number which appears on the face of this Order, and shall indicate that they are in payment of stipulated penalties. A copy of the transmittal of payment and check shall be sent to EPA's Project Coordinator.

69. Payment of said penalties shall not relieve Respondents of the responsibility to comply with this Order.

XXII. RESERVATION OF RIGHTS

70. Except as specifically provided in this Order, and subject to Section XXVI (Covenant Not to Sue by EPA) of this Order, nothing herein shall limit the power and authority of EPA or the United States to take, direct, or order all actions necessary to protect public health,

welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, at or from the Site. Further, except as expressly provided in this Order and subject to Section XXVI (Covenant Not to Sue by EPA) of this Order, nothing herein shall prevent EPA from seeking legal or equitable relief to enforce the terms of this Order, from taking other legal or equitable actions as it deems appropriate and necessary, or from requiring Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law. Provided, however, EPA shall not seek civil penalties for violations of this Order for which stipulated penalties have been assessed pursuant to Section XXI (Stipulated Penalties), prior to the filing of a civil action to assess and/or collect such penalties. Subject to Section XXVI (Covenant Not to Sue by EPA), EPA reserves the right to bring an action against Respondents under Section 107 of CERCLA, 42 U.S.C. § 9607, for recovery of any response costs incurred by the United States related to this Consent Order or the Site and not reimbursed by Respondent, including, specifically, any costs incurred by the United States in performing the Work, in the event EPA takes over the Work pursuant to Paragraph 24 or 59 of this Order.

71. Except as expressly provided in this Order, Respondents reserve all rights, causes of action, defenses and claims they have with respect to liability for releases or threatened releases of hazardous substances from the Site.

XXIII. COVENANT NOT TO SUE BY RESPONDENTS

72. Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Oversight Response Costs, or this Order, including, but not limited to:

- a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107,

111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim in connection with the Work, including any claim under the United States Constitution, the Nebraska Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or

c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Work.

These covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to the reservations set forth in Section XXII (Reservations of Rights), but only to the extent that Respondents' claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

73. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXIV. OTHER CLAIMS

74. By issuance of this Order, the United States and EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent. Neither the United States nor EPA shall be a party or be held out as a party to any contract entered into by the Respondents or their agents, successors, representatives, contractors, or assigns in carrying out activities pursuant to this Order.

75. Except as provided herein, this Order does not constitute a satisfaction of or release from any claim or cause of action against the Respondents or any person not a party to this Order, for any liability such person may have under CERCLA, RCRA or other statutes, or

the common law, including, but not limited to, any claims of the United States for costs, damages and interest under Sections 104 and 107(a) of CERCLA, 42 U.S.C. §§ 9604 and 9607(a).

76. No action or decision by EPA pursuant to this Order shall give rise to any right to judicial review except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXV. CONTRIBUTION

77. With regard to claims for contribution against Respondents for Matters Addressed in this Order, the Parties hereto agree that Respondents are entitled to protection from such contribution actions or claims to the extent provided by Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2). For purposes of this Order, "Matters Addressed" shall be all Work performed and all payments made pursuant to this Order.

78. Nothing in this Order precludes the United States or Respondents from asserting any claims, causes of action or demands against any persons who are not parties to this Order for indemnification, contribution, or cost recovery.

79. Respondents agree that with respect to any suit or claim for contribution brought against them for matters covered by this Order, they will notify EPA of the institution of the suit or claim within thirty (30) days of service of any such suit or claim.

XXVI. COVENANT NOT TO SUE BY EPA

80. Except as otherwise specifically provided in this Order, upon issuance of the EPA notice referred to in Section XXX (Notice of Completion), EPA covenants not to sue Respondents or to take administrative action against Respondents for the Work performed under this Order.

81. Except as otherwise specifically provided in this Order, in consideration and upon Respondents' payments of the Oversight Costs specified in this Order, EPA covenants not to sue

or to take administrative action against Respondents under Section 107(a) of CERCLA for the recovery of Oversight Response costs incurred by the United States under this Order.

82. The covenant not to sue set forth in Paragraph 80 shall take effect upon issuance of the EPA notice referred to in Section XXX (Notice of Completion). The covenant not to sue set forth in Paragraph 81 shall take effect upon receipt by EPA of the payments required by Section XVIII (Reimbursement of Costs).

83. These covenants not to sue are conditioned upon the complete and satisfactory performance by Respondents of their obligations under this Order. These covenants not to sue extend only to the Respondents and do not extend to any other person.

XXVII. INDEMNIFICATION

84. Respondents agree to indemnify, save and hold harmless the United States, its officials, agents, contractors, and employees from any and all claims or causes of action arising from, or on account of, negligent or otherwise wrongful acts or omissions of Respondent, their respective officers, employees, contractors, subcontractors, receivers, trustees, agents, successors or assigns, in carrying out activities pursuant to this Order, including, but not limited to, claims arising from construction delays.

85. Respondents agree to pay the United States all costs the United States incurs, including, but not limited to, attorney's fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States based on negligent or otherwise wrongful acts or omissions of Respondent, or any of its officers, directors, employees, agents, contractors, subcontractors, and any persons acting on its behalf or under its control, in carrying out activities pursuant to this Order.

XXVIII. FINANCIAL ASSURANCE

86. Within 30 days of the Effective Date, Respondents shall establish and maintain financial security in the amount of \$200,000 in one or more of the following forms:

- a. A surety bond guaranteeing performance of the Work;
- b. One or more irrevocable letters of credit equaling the total estimated cost of the Work;
- c. A trust fund;
- d. A guarantee to perform the Work by one or more parent corporations or subsidiaries, or by one or more unrelated corporations that have a substantial business relationship with a Respondent; or
- e. A demonstration that a Respondent satisfies the requirements of 40 C.F.R. Part 264.143(f).

87. If Respondents seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 86(a) of this Section, Respondents shall demonstrate that the guarantor satisfies the requirements of 40 C.F.R. Part 264.143(f). If a Respondent seeks to demonstrate its ability to complete the Work by means of the financial test or the corporate guarantee pursuant to Paragraph 86(d) or (e) of this Section, it shall resubmit sworn statements conveying the information required by 40 C.F.R. Part 264.143(f) annually, on the anniversary of the Effective Date. In the event that EPA determines at any time that the financial assurances provided pursuant to this Section are inadequate, Respondents shall, within 30 days of receipt of notice of EPA's determination, obtain and present to EPA for approval one of the other forms of financial assurance listed in Paragraph 86 of this Section. Respondents' inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Order.

88. If, after the Effective Date, Respondents can show that the estimated cost to complete the remaining Work has diminished below the amount set forth in Paragraph 86 of this Section, Respondents may, on any anniversary date of the Effective Date, or at any other time agreed to by the Parties, reduce the amount of the financial security provided under this Section to the estimated cost of the remaining Work to be performed. Respondents shall submit a proposal for such reduction to EPA, in accordance with the requirements of this Section, and may reduce the amount of the security upon approval by EPA. In the event of a dispute, Respondents may reduce the amount of the security in accordance with the written decision resolving the dispute.

89. Respondents may change the form of financial assurance provided under this Section at any time, upon notice to and approval by EPA, provided that the new form of assurance meets the requirements of this Section. In the event of a dispute, Respondents may change the form of the financial assurance only in accordance with the written decision resolving the dispute.

XXIX. MODIFICATIONS

90. Modifications to the Work Plan may be made orally or in writing by mutual agreement of the Parties' Project Coordinators. If the Project Coordinators agree to an oral modification, it will be memorialized in writing within thirty (30) days; provided, however, that the effective date of the modification shall be the date of the Project Coordinators' oral agreement. Any other requirements of the Order may be modified in writing by mutual agreement of the Parties.

91. If Respondents seek permission to deviate from the Work Plan, Respondents' Project Coordinator shall submit a written request to EPA's Project Coordinator for approval outlining the proposed modification and its basis.

92. No informal advice, guidance, suggestion or comment by EPA regarding reports, plans, specifications, schedules, or any other writing submitted by Respondents shall relieve Respondents of their obligation to obtain such formal approval as may be required by this Order, and to comply with all requirements of this Order unless or until this Order may be formally modified.

XXX. NOTICE OF COMPLETION

93. Upon EPA's determination that all activities required hereunder by Respondents have been fully performed in accordance with this Order, with the exception of any continuing obligations required by this Order under Section XIII (Record Retention), Section XVIII (Reimbursement of Costs), and Section XXII (Reservation of Rights), EPA will provide notice to Respondents. If EPA reasonably determines that any activities required herein by Respondents have not been completed in accordance with this Order, EPA will so notify Respondents, provide a list of the deficiencies, and require that Respondents correct such deficiencies in accordance with EPA's notice. Any resubmittals will be reviewed by EPA in accordance with Section XI (Submissions Requiring Agency Approval).

XXXI. SIGNATURE BY PARTIES

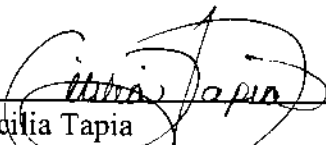
94. This Order may be executed in any number of counterparts, each of which when executed and delivered to EPA shall be deemed to be an original, but such counterparts shall together constitute one and same document.

XXXII. EFFECTIVE DATE

95. This Order shall become effective upon receipt by Respondents of a fully executed copy of this Order.

IT IS SO ORDERED.

For the United States Environmental Protection Agency:



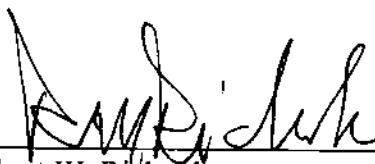
Cecilia Tapia

Director

Superfund Division

Region VII, United States Environmental Protection Agency

DATE: 4/9/04



Robert W. Richards

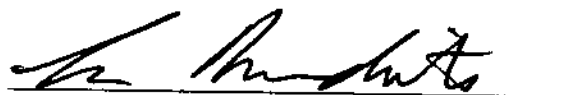
Assistant Regional Counsel

Region VII, United States Environmental Protection Agency

DATE: 4/8/04

In the Matter of Columbus Former Manufactured Gas Plant Site, Docket No. CERCLA-07-2003-0307. Proceedings under Sections 104, 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. §§ 9604, 9607 and 9622).

For Centel Corporation, a Kansas Corporation:



Name:

Title:

DATE: 3/29/04

In the Matter of Columbus Former Manufactured Gas Plant Site, Docket No.
CERCLA-07-2003-0307. Proceedings under Sections 104, 107 and 122 of the Comprehensive
Environmental Response, Compensation, and Liability Act (42 U.S.C. §§ 9604, 9607 and 9622).

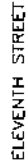
For Aquila, Inc., a Delaware Corporation:



Name: DAN MECHTENBERG

Title: MANAGER, BUSINESS OPERATIONS

DATE: 3/23/04



LEGEND

- | | |
|---------|--|
| — | CURRENT STRUCTURE |
| - - - | FORMER STRUCTURES |
| * - - | FENCE |
| + + + | RAILROAD TRACKS |
| - - - | ROADWAY |
| CAP. | CAPACITY |
| CU. FT. | CUBIC FEET |
| ⊙ | SOIL BORING DEVELOPED INTO A MONITORING WELL |
| ⊕ | SOIL BORING |

NOTES

1. SEE SITE LOCATION MAP, FIGURE 1.1 FOR GENERAL LOCATION OF FACILITY.
2. SOURCE: 1925 SANBORN INSURANCE MAP.

IIR

HDR Engineering, Inc.

Columbus, NE Facility Boring/Monitoring Well Locations

Former CENTEL, Inc.
Manufactured Gas Plant Site
Columbus, Nebraska

Date	Ocl. 1992
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Figure 2.1

REMOVAL SITE EVALUATION

WORK PLAN

Columbus Former Manufactured Gas Plant
Site
1169 22nd Avenue
Columbus, Nebraska 68601

Prepared for
Centel Corporation
For Submission
To EPA / NDEQ

January 2004

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1.0 Introduction

This work plan was prepared to define the scope of work and schedule for conducting a Removal Site Evaluation (RSE) at the former manufactured gas plant (MGP) site (herein referred to as the Site) located at 1169 22nd Avenue in Columbus, Nebraska.

The purpose of the RSE is to further evaluate the nature and extent of source material, soil, and groundwater contamination, and to provide a database to prepare a baseline risk assessment, if necessary, to evaluate the potential risk to human health and the environment from site source areas, soil, and groundwater. During the RSE, baseline data will also be obtained on the groundwater conditions prior to the implementation of the unrelated U.S. Environmental Protection Agency (EPA) groundwater extraction well system associated with the 10th Street Superfund Site, as well as obtain groundwater data for future groundwater remedial action evaluation, if necessary.

The RSE will be conducted in accordance with the Administrative Order on Consent (AOC) (EPA 2003) and will be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

1.1 Authority for the Work

Black & Veatch Corporation (Black & Veatch) has been retained by Centel Corporation (Centel) to provide environmental and engineering services at the Site. As a part of these services, Black & Veatch will perform a RSE for the Site.

1.2 Scope of the RSE Work Plan

This work plan was prepared as an Attachment to the AOC established with the EPA (EPA 2003). The work plan includes this introduction that contains the purpose and objectives of the RSE; a brief discussion on the Site background, including identifying the potential source areas (Section 2.0); a preliminary risk evaluation (Section 3.0); a detailed scope of work for the RSE (Section 4.0); a schedule of planned activities (Section 5.0); and references (Section 6.0). Additional information for use during the project is provided in the Sampling and Analysis Plan (SAP), which includes the Field Sampling Plan (FSP) and

the Quality Assurance Project Plan (QAPP), and the Health and Safety Plan (HASP). The HASP will be prepared under separate cover.

1.3 Objectives of the RSE

The overall objectives of the RSE are to further evaluate the nature and extent of source material, soil, and groundwater contamination, and to obtain data to develop a database to conduct a baseline risk assessment, if necessary. In addition, the RSE is being conducted to obtain baseline data on the groundwater conditions prior to the implementation of the EPA groundwater extraction well system associated with the 10th Street Superfund Site.

The specific objectives of the RSE are:

- Characterize and confirm the presence of source material, if present, and soil and groundwater contamination.
- Obtain legally defensible and statistically representative analytical data for use in a risk assessment, if necessary.
- Determine the horizontal and vertical extent of potential source areas to calculate the volume of waste at the Site and to identify areas that may require a removal action.
- Determine the physical and chemical characteristics of on Site source areas.
- Evaluate the potential for contaminant migration from on Site source areas.
- Evaluate the potential contribution of sources other than the Site to off Site contamination.
- Develop a sufficient analytical database to characterize Site contamination, so that removal actions may be developed, if necessary.
- Further define the nature and extent of groundwater contamination resulting from the Site.
- More fully define the chemical characteristics of groundwater, so that remedial actions may be developed, if necessary.

2.0 Background Information

The purpose of this section is to present Site background information, a brief summary of the nature and extent of contamination, and identify the potential source areas and existing data gaps. Other background information such as history and physical characteristics of the Site are not discussed in this report, but can be found in the *Groundwater Investigation Work Plan* (B&V 2003a) and the *Removal Site Evaluation for Groundwater Report* (B&V 2003b), which were completed as part of the RSE for the shallow sand aquifer groundwater.

2.1 Site Location and Description

The City of Columbus is located in the east-central portion of the State of Nebraska in Platte County, as shown on Figure 2-1. The Site is located in the south central portion of the city, at 1169 22nd Avenue. It occupies approximately one-half acre in the southwest quarter of Section 19, Township 17 North, Range 1 East. The Site, currently owned by Aquila Inc., is used for limited storage purposes. A security fence restricts access to the Site. The layout of the Site is shown on Figure 2-2. The Site is bound to the south and east by residential properties, to the north by railroad tracks, and to the west by light industrial property.

2.2 Previous Investigations

Four environmental investigations have been completed at the Site, which include a preliminary assessment in January 1991 by Ecology and Environment, Inc.; a site investigation conducted by HDR Engineering in May 1992; a Phase I Environmental Assessment conducted by Barr Engineering Company in 1995; and a RSE for groundwater conducted by Black & Veatch in 2003. On Site investigation activities included the installation of 3 monitoring wells, 11 soil probes/borings, and the sampling and analysis of soil and groundwater samples. Off Site investigation activities included advancing and sampling 9 groundwater probes and sampling 4 existing EPA monitoring wells. Detailed discussions of the previous investigations can be found in the *Groundwater Investigation Work Plan* (B&V 2003a) and *Removal Site Evaluation for Groundwater Report* (B&V 2003b).

Multiple additional investigations not related to the Site have been performed in the area by the EPA to address the unrelated 10th Street Superfund Site. Relevant data from these investigations were reviewed to assist in the development of this work plan. However,

specific results of the investigations related to the 10th Street Superfund Site are not discussed in this work plan.

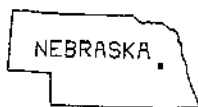
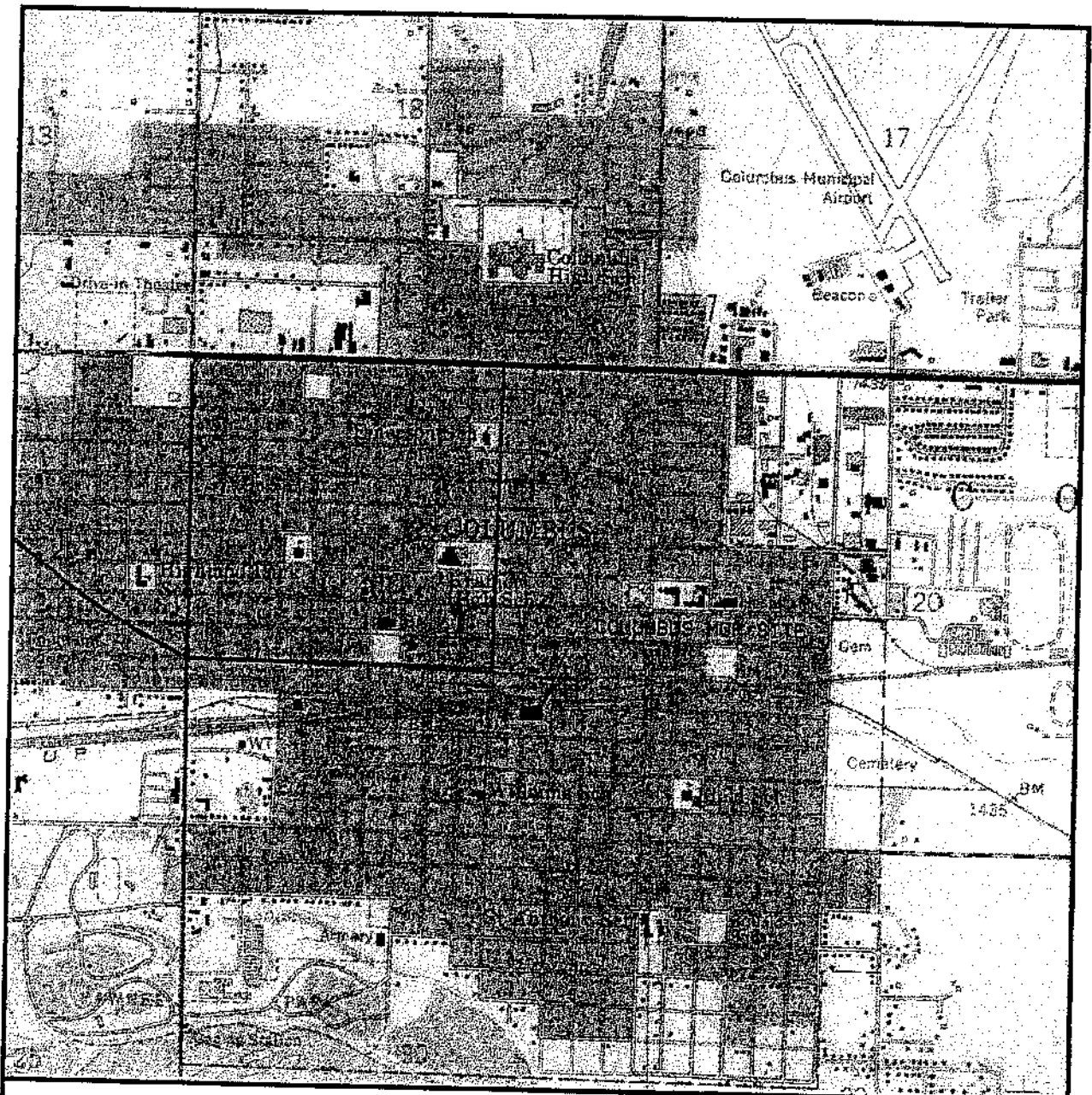
Based on the results of previous investigations, the following general conclusions can be made regarding the overall nature and extent of contamination at the Site:

- Residuals from former operations are present at the Site. This was evidenced by the presence of MGP-related chemicals, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and cyanide, in subsurface soil samples collected from the Site (HDR 1992).
- One soil boring advanced within the gas holder indicated that the structure may be present below grade at the Site. Perched groundwater was encountered at 3 feet below ground surface (bgs) and the boring was stopped on wood material at 5 feet bgs (HDR 1992). There were no other indications of below grade structures in any of the other probes or borings. No samples of source material have been obtained.
- Groundwater samples collected from the three on Site monitoring wells indicated that several MGP-related contaminants are present above maximum contaminant levels (MCLs). Several polynuclear aromatic hydrocarbons (PAHs) and ethylbenzene, toluene, and total xylenes were detected in the shallow sand aquifer on and off the Site. Neither total nor weak acid dissociable cyanide were detected in any of the groundwater samples collected on or off the Site. Groundwater has only been sampled from the shallow sand aquifer and not from the underlying intermediate and deep aquifers.

2.3 Identification of Potential Source Areas

On the basis of historical information regarding the Site, five potential source areas have been identified:

- Former operations building that contained the retort, gas engine, and coke storage located in the general location of the current storage building.
- Area of the five former iron gas storage tanks located east of the storage building.
- A gas holder located between the storage building and service operations building.
- Two sets of former tar tanks located northeast and northwest of the gas holder.
- A former gas tank located in the northeast corner of the Site.



QUADRANGLE LOCATION

SOURCE: USGS 1976




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FIGURE 2-1
SITE LOCATION
COLUMBUS MGP SITE
RSE WORK PLAN
 65310-1420-A088-GENUP-C-B000035FX

The iron gas storage tanks are believed to be formerly above grade. All other tanks, including the gas holder, are potentially below grade structures. No information is available regarding whether or not the tanks were removed below grade. All of these potential source areas are shown on Figure 2-2.

2.4 Existing Data Gaps

Several data gaps were identified related to site characterization because of the limited existing information on the Site source and soil characteristics. This information is critical to adequately characterize the Site. In addition, obtaining the baseline conditions of the groundwater in the shallow and intermediate sand aquifers is necessary prior to the implementation of the EPA groundwater extraction well system associated with the 10th Street Superfund Site to determine the effect the groundwater pumping will have on the Site-related contaminant plume. A list of data gaps organized by area of concern is presented in Table 2-1. Investigative procedures recommended to obtain the required data are addressed in Section 4.0 of this work plan.

TABLE 2-1
IDENTIFIED DATA GAPS
Columbus MGP Site
RSE Work Plan

Area of Concern	Data Gaps	Investigative Procedures
Gas Holder Base	<p>Is the structure present?</p> <p>Does the structure contain source material, and if so, what are the chemical characteristics?</p> <p>If source material is present, has it contaminated the surrounding soil?</p>	Excavate a trench to determine the location of the structure. Advance multiple probes in and around the gas holder base and submit samples for chemical analysis to characterize soil and any source material.
Area of Iron Gas Storage Tanks	What is the horizontal and vertical extent of soil contamination, if any, in the area of the tanks?	Advance soil probes in the area of these tanks and submit subsurface soil samples for chemical analysis.
Gas Tank	<p>Is the structure present?</p> <p>Does the structure contain source material, and if so, what are the chemical characteristics?</p> <p>If source material is present, has it contaminated the surrounding soil?</p>	Excavate a trench to determine the location of the structure. Advance probes in and around the gas tank and submit samples for chemical analysis to characterize soil and any source material.
Tar Tanks	<p>Are the structures present?</p> <p>Do the structures contain source material, and if so, what are the chemical characteristics?</p> <p>If source material is present, has it contaminated the surrounding soil?</p>	Excavate two trenches to locate the tar tanks. Advance probes in and around the tar tanks, and submit samples for chemical analysis to characterize soil and any source material.
Former Operations Building	What is the horizontal and vertical extent of soil contamination, if any, in the area of the former building?	Advance several soil probes in the area of the former building and submit subsurface soil samples for chemical analysis.
Subsurface Soil	What is the extent of subsurface soil contamination on Site, outside the potential source areas?	Advance soil probes and submit subsurface soil samples for chemical analysis.
Shallow Soil	What is the extent of shallow, near surface soil contamination near the adjacent residential property?	Advance four soil probes on Site, adjacent to the residential property.
Background/Off Site Soil Conditions	What are the background/off Site soil concentrations in the area of the Site?	Advance two soil probes off Site, approximately one city block away from the Site and submit subsurface soil samples for chemical analysis.
Groundwater	<p>Has the groundwater in the intermediate sand aquifer been impacted by the Site?</p> <p>What effect will the EPA 10th Street Superfund Site groundwater removal action have on the Site-related groundwater contaminant plume?</p> <p>Is the Site-related groundwater plume naturally attenuating?</p>	Monitoring wells will be installed in the intermediate sand aquifer to determine if this aquifer has been impacted by the Site. Groundwater samples will be collected from these wells, in addition to the wells to be installed in the shallow sand aquifer, and selected existing wells before the groundwater removal action becomes operational at the EPA 10 th Street Superfund Site to establish baseline conditions. In addition, monitored natural attenuation parameters will be collected from the wells.

3.0 Preliminary Risk Evaluation

A preliminary risk evaluation of existing Site information was performed to identify potential risks to public health and the environment posed by contaminants present on the Site. The assessment is based on a preliminary evaluation of the waste materials associated with MGP sites and compounds identified during previous investigations at the Site.

The preliminary risk evaluation is qualitative in nature. The first step in this risk process is to identify potential compounds of concern and their inherent toxicity characteristics. The second step involves identifying the potential pathways of contaminant migration, as well as the identification of the potential human or environmental receptors and methods of exposure (e.g., ingestion, inhalation, or dermal contact). The results of the RSE investigation will be used to develop a quantitative risk assessment, if necessary.

3.1 Principal Chemicals of Concern

On the basis of a review of analytical data from previous site investigations and applicable literature, the primary compounds of concern associated with MGP sites are PAHs and the volatile aromatic compounds, including benzene, toluene, ethylbenzene, and total xylenes (BTEXs). These contaminants have been associated with the byproducts and residuals generated during the production of manufactured gas.

Contaminants other than PAHs and volatile aromatic compounds have also been associated with byproducts and residuals generated during the coal gasification process. These contaminants of concern can be divided into the following general categories: phenols, spent oxides, and metals.

Phenols are organic compounds contained in the acids of coal tars that were formed during the manufactured gas cooling process (EPA 1988). These compounds were produced in the largest quantities in the coal carbonization production processes. Gas was manufactured at the Site using the Tenney water gas process for approximately 17 years. The coal carbonization process was not used (Brown 1915-1933).

Spent oxides were typically formed during gas cleaning by passing the gas through purifiers containing iron filings and wood chips to remove hydrogen sulfide (H₂S) (EPA 1988). Spent oxide wastes are typically high in sulfur content and also contain ammonia and

cyanide. Limited amounts of ammonia and cyanide are reportedly produced in the carbureted water gas production process, and trace metals from coal are typically associated with gas plant ash and spent oxides (EPA 1988). Trace metals typically associated with MGPs include arsenic, barium, cadmium, chromium, and lead.

3.2 Toxicity Assessment

The purpose of a toxicity assessment is to weigh available evidence regarding the potential for the chemicals of potential concern to cause adverse effects in exposed populations, and to estimate the relationship between the extent of exposure to a contaminant and the increased likelihood and severity of adverse effects. Toxicological data are presented in Appendix B and include contaminant characteristics and health effects for the specific chemicals of potential concern for the Site. Some of these chemicals of potential concern were previously detected in site media. The data presented in Appendix B will be updated per standard default toxicity data in use at the time of completion of the baseline risk assessment, if a baseline risk assessment is determined to be necessary.

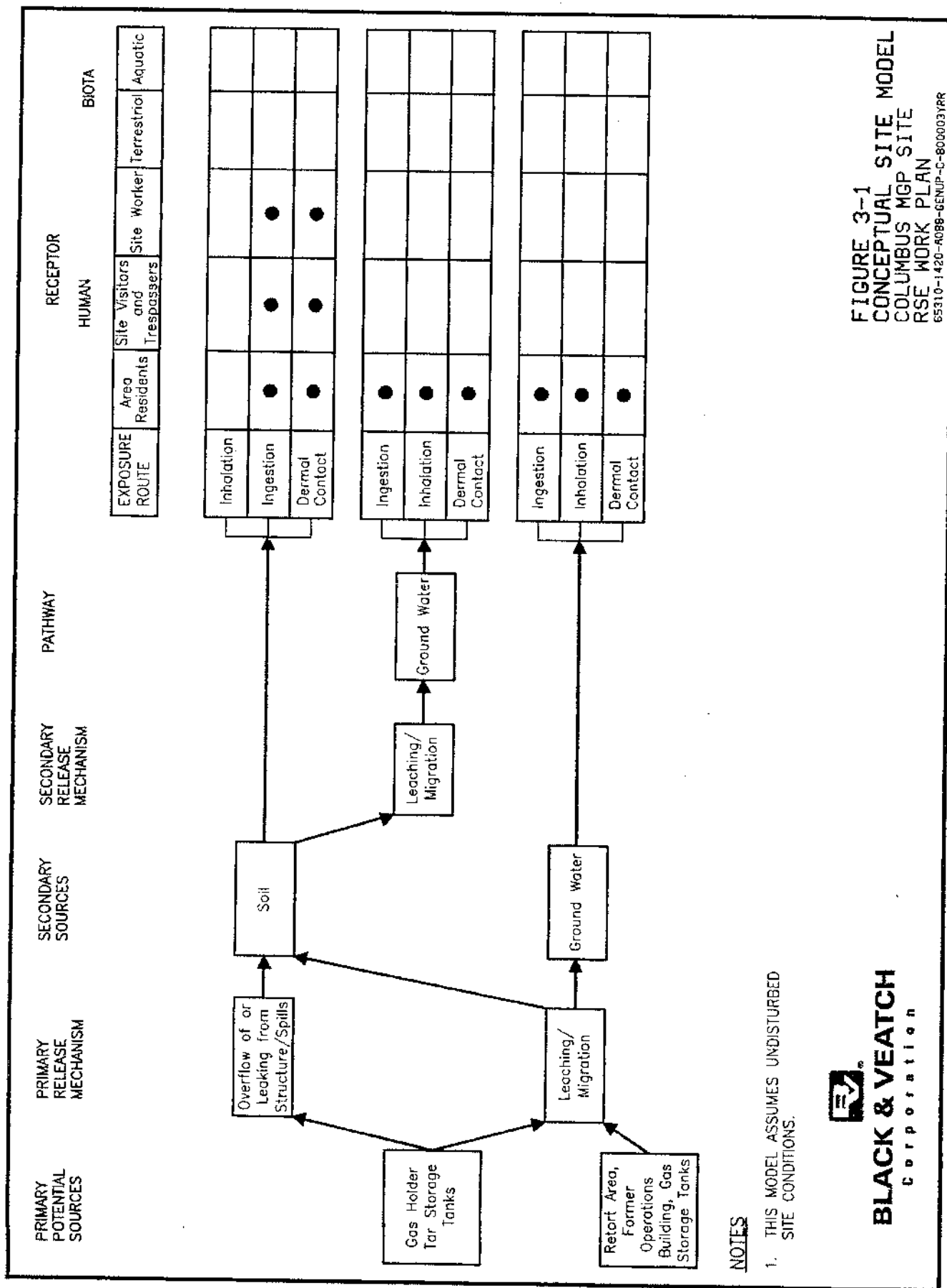
3.3 Exposure Assessment

A conceptual model of the Site has been developed to aid in the understanding of the possible sources of contamination, the potential migration pathways, and the potential receptors associated with the Site. This conceptual site model is shown on Figure 3-1.

The primary potential sources of contamination are areas where Site byproducts may be present. These areas include the former operations building, the former gas tank, the former tar tanks, the gas holder base, and the former iron gas storage tank area. The locations of the primary potential source areas are shown on Figure 2-2.

The primary release mechanisms associated with the former Site structures include overflows, leaks, or spills, and leaching and migration. The primary release mechanisms result in secondary sources of contamination, on Site soil and groundwater. Secondary release mechanisms include leaching from soil into the groundwater and contaminant migration from soil to ground water.

The potential migration pathways include soil, air, and groundwater. Potential receptors include Site workers, area residents, and Site visitors and trespassers.



NOTES

1. THIS MODEL ASSUMES UNDISTURBED SITE CONDITIONS.



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FIGURE 3-1
CONCEPTUAL SITE MODEL
COLUMBUS MGP SITE
RSE WORK PLAN
65310-1420-A098-GENUP-C-800003YRR

The RSE investigation will further assess and characterize the exposure associated with the soil and the groundwater pathway. The air pathway is not currently considered a significant exposure pathway because most of the Site is covered with concrete or asphalt. Also, the air pathway should not be a major concern during the field investigation activities because the proposed tasks will not require movement or treatment of large volumes of contaminated material. The air pathway will be of greater concern during any removal action completed at the Site, if necessary.

The Site is predominantly residential to the south and east, with a light industrial area to the west. The Site is bordered on the north by railroad tracks and commercial development. Because of the lack of a significant air pathway and the presence of a security fence around the Site, the current exposure to area residents, visitors, and trespassers from Site contaminants is assumed to be minimal.

3.4 Risk Characterization

On the basis of previous investigations at the Site and the discussion presented in Section 3.3, a broad list of chemicals of potential concern, the primary exposure pathways, and the primary exposed populations have been identified to complete a human health risk assessment, if necessary. However, much of the existing information is inadequate to determine the specific chemicals of concern and to assess the magnitude of the risk that these chemicals pose. These data gaps will be addressed through the performance of the RSE field activities.

4.0 Scope of Work

This section discusses the specific tasks associated with the scope of work for the RSE. Individual tasks that compose the scope of work are described in the following subsections. Submittal of deliverable items to EPA for review will be accomplished as indicated on the schedule presented in Section 5.0.

4.1 RSE Field Activities

This task will involve all operations associated with performing the RSE field activities at the Site. Specific activities include subcontractor procurement, field investigation support, and the actual field operations.

4.1.1 Procurement of Subcontractors

This task involves procuring subcontractors for field investigation activities requiring specialized services. Subcontracted services will include test trench excavation, subsurface drilling and probing, monitoring well installation, laboratory analyses, data validation, and surveying.

4.1.2 Field Investigation Support

Based on the proposed soil probe, monitoring well, and groundwater sampling locations, access agreements will be required from the City of Columbus, Aquila, Union Pacific Railroad, and the EPA. All off Site monitoring wells will be installed within the city right-of-way and on Union Pacific Railroad property.

4.1.3 Field Investigation Activities

The RSE field investigation will consist of excavating trenches, advancing soil probes, drilling boreholes, installing monitoring wells, and collecting subsurface soil, source material, and groundwater samples for chemical analysis. The following subsections discuss the sample locations, the purpose of the samples, the number of samples by sample media at each location, and the analytical methods to be used in the chemical analysis of the samples. The field methods and procedures to be followed during the RSE field activities are presented in the SAP.

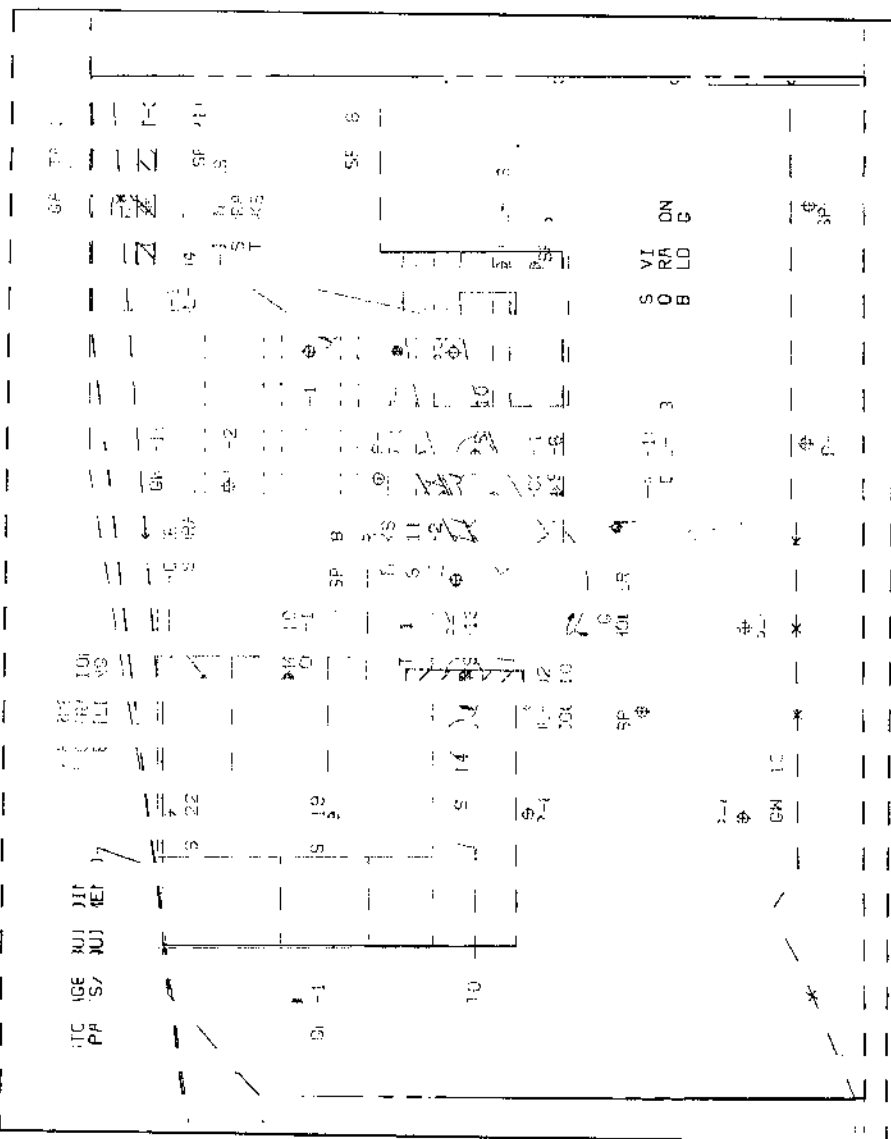
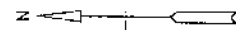
4.1.3.1 Exploratory Excavation. Three test trenches will be excavated on Site to locate potential below grade structures. The test trenches will be excavated near the anticipated

locations of the gas tank, gas holder, and the two tar tanks not covered by concrete, based on historic information. As shown on Figure 4-1, test trenches TT-1 and TT-2 will be excavated to determine the presence, location, and extent of the gas holder and tar tanks. Test trench TT-3 will be excavated in the northeast corner of the Site to determine the presence, location, and extent of the former gas tank. Table 4-1 presents the specific rationale for each test trench.

The trenches will be excavated to a maximum depth of 5 feet for the purpose of locating structure walls to determine the horizontal extent of the structure and to locate a planned probe inside the structure. The trenches will not be excavated in areas covered by concrete. A geologist or geological engineer will log the trenches, and the soil will be screened with a photoionization detector (PID). If visibly contaminated material is encountered or the soil exhibits a hydrocarbon odor, an effort will be made not to remove the material from the trench and the trench will not be continued vertically. However, the excavation will proceed horizontally in visibly clean material to locate the structure walls, if present. The trenches may need to be extended horizontally if the structure walls are not encountered in the anticipated locations.

The asphalt that will be broken through to excavate the test trenches will be set aside and will not be used to backfill the trench. It will be disposed of appropriately. The top 1 foot of soil removed from the trench will be stockpiled separately from the soil excavated from greater depths in the trench. The trench will be backfilled by first placing the soil excavated from greater than 1 foot below ground surface (bgs) in the trench in 1-foot lifts. The soil excavated from the top 1 foot of the trench will then be placed back in the trench on top of the soil that was excavated from depths below 1 foot. Each 1-foot lift of backfill will be compacted using a plate compactor or other appropriate equipment. The top 3 to 4 inches of the trench (approximate thickness of asphalt layer) will be backfilled with AB3, which is a multi-gradational gravel, or equivalent and this surface layer will be compacted to provide a usable surface.

During test trench excavation, the horizontal limits of each structure will be measured and recorded. Care will be taken to minimize air emissions by not excavating any material that is visibly contaminated or contains an odor associated with Site contamination. Excavation equipment will be decontaminated as outlined in the SAP.



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1	P	P	D	I	P	E
2	T	T	E	I		
3	E	S	G	I	P	E
4	H	T	T	E	I	T
5	P	V	S	I	J	E
6	C	C	E	I	E	R
7	C	U	S	P	I	
8	P	P	E	N		
9	E	S	G	R	I	S
10	F	M	S	C	R	
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4.1.3.2 Subsurface Soil Investigation. At least 25 soil probes will be advanced on and near the Site during the RSE field investigation. Additional probes may be required to fully characterize the Site and will be added in the field as determined by the field engineer/geologist. The specific rationale for each soil probe location is presented in Table 4-1 and the proceeding paragraphs. The approximate locations of the probes are shown on Figures 4-1 and 4-2.

TABLE 4-1
PROPOSED TEST TRENCHES AND SOIL PROBES
Columbus Former MGP Site
RSE Work Plan

Location Designation	Location Description	Estimated Depth	Purpose
TT-1 and TT-2	Gas holder and tar tanks.	5 feet (maximum)	Determine the presence of the below grade structure walls and, if present, determine their lateral extent.
TT-3	Gas tank in the northeast corner of Site.		
SP-1 and SP-2	Southeast edge of site.	16 feet	Determine the nature and extent of soil contamination on Site and obtain near surface samples for evaluation of residential soil exposure risk, if necessary.
SP-3 through SP-9, SP-15, SP-17 through SP-20, SP-22	Throughout the property based on a systematic sampling grid.	16 feet	Determine the nature and extent of soil contamination on Site and provide statistically representative data for performing a risk assessment, if necessary.
SP-10 through SP-14, SP-23	Located within former structures based on historical information.	5 to 16 feet	Evaluate the nature of source material and contaminated soil/debris, if present, within the former structures. Evaluate the depth to the structure base, if present. Locations will be adjusted in the field depending on test trench findings.
SP-16 and SP-21	Northeast edge of site adjacent to residential property.	16 feet	Determine the nature and extent of contamination on Site and obtain near surface samples for evaluation of residential soil exposure risk, if necessary.
SP-24 and SP-25	To the east and west of the Site.	16 feet	Evaluate background soil conditions and the potential contribution of sources other than the Site to off Site contamination.

Soil probes will be advanced with a hydraulic direct-push probing unit. All of the probes will be sampled continuously and logged by a geologist or geological engineer to allow for accurate determination of stratigraphy. PID field screening results will be included on the logs.

Systematic sampling was used to determine the majority of the probe locations by establishing a modified grid pattern across the Site, to best characterize the nature, magnitude, and extent of contaminant migration and to identify any unknown source structures that may be present. Advancing probes in a grid pattern also provides statistically representative data in a cost effective manner, as opposed to conventional drilling. In addition, probes will be advanced into structures located during the test trenching activities. The specific rationale for each probe is presented in Table 4-1.

Soil probes SP-1 through SP-9 and SP-15 through SP-22 will be advanced on Site to characterize the soil outside of a source structure. Soil probes SP-10 through SP-14 and SP-23 will be advanced into potential below grade source structures to evaluate the presence of source material and to determine the vertical extent of the structures. Soil probes SP-24 and SP-25 will be advanced off Site to determine background soil conditions and to evaluate the potential contribution of sources other than the Site to off Site contamination. These probes will be advanced east and west of the Site, approximately one block away from the Site.

All of the soil probes will be advanced to a depth of 16 bgs, except where a possible structure base has been encountered (e.g., probe refusal). When probe refusal is encountered below a zone of contamination indicating a possible structure base, the probe will be terminated so as not to penetrate the structure base. If probe refusal is encountered above 6 feet bgs and contamination is not present in the overlying soil, an attempt will be made to probe through the refusal zone to determine if a cover is present on the structure or if the difficult probing is due to isolated debris or a rubble layer. Whenever probe refusal is encountered (below a contaminated zone or in a zone that cannot be penetrated by the probe), the probe will be offset to verify refusal.

Soil samples will be collected and submitted for chemical analysis from all the soil probes advanced. Table 4-2 lists the proposed number of samples, as well as specific analyses to be performed at each location.

Two soil samples will be submitted for chemical analysis from each probe, with the exception of probes SP-1, SP-2, SP-16, SP-21, SP-24, and SP-25, from which three soil samples will be collected. In the probes where two samples will be collected, the samples will be taken from the zone that is the most visibly contaminated or exhibits the highest PID reading in the 1 to 6 foot and 6 to 12 foot bgs sampling intervals. If visible contamination is not present or the soil exhibits no PID reading in the respective sample interval, the soil samples will be collected from 3 to 3.5 feet bgs and 9 to 9.5 feet bgs. In addition to these two sample intervals, near surface soil samples (0.5 to 1 foot bgs) will be collected from probes SP-1, SP-2, SP-16, SP-21, SP-24, and SP-25.

TABLE 4-2
SUMMARY OF PROPOSED SOIL SAMPLE ANALYSES
Columbus Former MGP Site
RSE Work Plan

Analyses to Be Performed	Sample Location and Number of Samples per Location ⁽¹⁾							
	SP-3 through SP-9, SP-17, SP-18, SP-19, SP-22	SP-10, SP-14, SP-23	SP-11	SP-13	SP-1, SP-2, SP-16, SP-21, SP-24, SP-25	SP-15, SP-20	SP-12	Totals
BTEXs	2/0/0	2/0/0	2/0/0	2/1/0	3/0/0	2/1/1	2/0/1	56/3/3
PAHs	2/0/0	2/0/0	2/0/0	2/1/0	3/0/0	2/1/1	2/0/1	56/3/3
Phenols	0/0/0	0/0/0	2/0/0	2/1/0	0/0/0	0/0/0	2/0/1	6/1/1
Total Cyanide	2/0/0	2/0/0	2/0/0	2/1/0	3/0/0	2/1/1	2/0/1	56/3/3
RCRA Metals	2/0/0	2/0/0	2/0/0	2/1/0	3/0/0	2/1/1	2/0/1	56/3/3
RCRA HWC	0/0/0	1/0/0	1/0/0	1/1/0	0/0/0	0/0/0	1/0/1	6/1/1
Abbreviations: 3/2/1 primary/duplicate/MS-MSD samples BTEXs benzene, toluene, ethylbenzene, and total xylenes PAHs polynuclear aromatic hydrocarbons RCRA Resource Conservation Recovery Act RCRA HWC RCRA hazardous waste characteristics (ignitability, reactivity, and corrosivity)								
Notes: (1) Duplicate, matrix spike, and matrix spike duplicate samples will be collected for every 20 primary samples collected in the field.								

Chemical analyses to be performed on the soil samples will consist of PAHs (SW-846 Method 8270C SIM), BTEXs (SW-846 Method 8021B), total cyanide (SW-846 Method 9010), and selected Resource Conservation Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, and lead) (SW-846 Methods 6010B). If apparent source material is encountered in the soil probes advanced into any suspected below grade structures, a sample of this material will additionally be analyzed for RCRA hazardous waste characteristics (ignitability, corrosivity, and reactivity by SW-846 Methods 9045/1010/7.3). Also, to further characterize the soil and source material on Site in areas that have the potential to contain the highest levels of contamination, the samples collected from probes SP-11, SP-12, and SP-13 will additionally be analyzed for phenols (SW-846 Method 8270C).

4.1.3.3 Groundwater Investigation. The groundwater investigation will consist of monitoring well installation and sampling of existing monitoring wells and piezometers. Twelve monitoring wells will be installed at six locations on and near the Site and groundwater samples will be collected from the 12 newly installed wells and 10 existing monitoring wells and piezometers. The purpose of the investigation is to provide baseline groundwater conditions prior to the operation of the EPA's extraction wells and to provide long-term monitoring points on and surrounding the area of known MGP-related groundwater contamination. The locations of the proposed monitoring wells and existing monitoring wells and piezometers are shown on Figure 4-2. The specific rationale for each sampling location is presented in Table 4-3.

Monitoring well locations MW-201, MW-202, MW-203, MW-205, and MW-206 will consist of pairs of nested wells to monitor the upper and lower portions of the shallow sand aquifer. These wells will monitor the Site-related groundwater plume in the shallow sand aquifer and will provide data between the Site and the EPA extraction wells. At the location of monitoring well MW-201, a third monitoring well that is screened across the lower portion of the intermediate sand aquifer, that lies below the shallow sand aquifer, will also be installed. This well is being installed to determine if the Site has impacted the intermediate aquifer underlying the Site. An additional deep monitoring well (MW-204C) will be installed within the lower portion of the intermediate sand aquifer. This well will be nested with EPA piezometers KV-4 and KV-5, which monitor the upper and lower portions of the shallow sand aquifer. Well MW-204C is being installed to monitor the groundwater in the intermediate aquifer between the Site and EPA extraction well EW-02, which once operational will be pumping from this aquifer.

TABLE 4-3
PROPOSED GROUNDWATER SAMPLING LOCATIONS
Columbus Former MGP Site
RSE Work Plan

Monitoring Well Number	Location	Approximate Depth of Screen Interval ⁽¹⁾ (feet bgs)	Purpose
MW-201A	Southeast edge of Site.	10 - 20	Monitor groundwater conditions in the upper and lower portion of the shallow sand aquifer as well as the intermediate sand aquifer directly downgradient of the source structures.
MW-201B		60 - 70	
MW-201C		110 - 120	
MW-202A	Approximately two city blocks downgradient of the Site.	10 - 20	Monitor groundwater conditions in the upper and lower portions of shallow sand aquifer within the known extent of MGP-related groundwater contaminant plume.
MW-202B	Approximately four city blocks downgradient of the Site.	60 - 70	
MW-203A		10 - 20	Provide a sentinel location downgradient of the MGP-related groundwater contaminant plume to monitor groundwater conditions in the upper and lower portions of the shallow sand aquifer.
MW-203B	60 - 70		
KV-5	Northwest of the Site between extraction well EW-02 and the Site.	14 - 24 (existing)	Monitor the ground water conditions in the upper and lower portions of the shallow sand aquifer as well as the intermediate sand aquifer between the Site and EPA extraction well EW-02, to detect any potential migration of MGP-related groundwater contamination toward the extraction well.
KV-4		50.5 - 60.5 (existing)	
MW-204C		110 - 120	
MW-205A	Approximately 1/2 city block northwest of the Site.	10 - 20	Monitor groundwater conditions in the upper and lower portions of shallow sand aquifer north of the Site.
MW-205B	Approximately 1 city block west of the Site.	60 - 70	
MW-206A		10 - 20	Monitor groundwater conditions in the upper and lower portions of shallow sand aquifer west of the Site.
MW-206B	60 - 70		
MW-103	On Site	12.5 - 22.5 (existing)	Monitor shallow groundwater conditions on Site adjacent to potential source structures.
MW-104	On Site	11.5 - 21.5 (existing)	Monitor shallow groundwater conditions on Site adjacent to potential source structures.
MW-105	On Site	13.5 - 23.5 (existing)	Monitor shallow groundwater conditions on Site adjacent to potential source structures.
MW-3A	Southwest of the Site between the City's Well Field and the Site.	10.5 - 25.5 (existing)	Monitor groundwater conditions in the upper and lower portions of the shallow sand aquifer as well as the intermediate sand aquifer between the Site and the city's well field to detect any potential migration of MGP-related groundwater contamination toward the well field and well W-1.
MW-3B		59.1 - 69.1 (existing)	
MW-3C		117 - 127 (existing)	
MW-15A	Northeast of the Site between the proposed extraction well EW-03 and the Site.	9.5 - 24.5 (existing)	Monitor groundwater conditions in the upper and lower portions of the shallow sand aquifer between the Site and the proposed EPA extraction well EW-03, to detect any potential migration of the MGP-related groundwater contamination toward the extraction well.
MW-15B		64 - 74 (existing)	
Note: (1) The actual screened interval of wells being installed will depend on the total depth of the monitoring well.			

All monitoring wells will be installed by first determining the depth of the bottom of the shallow sand aquifer by probing with an electrical conductivity (EC) probe. Once the depth of the shallow sand aquifer has been determined, the monitoring wells in the shallow sand aquifer will be installed using a conventional drill rig. The shallow monitoring wells will be installed using hollow stem augers to a depth of 20 feet bgs with a 10-foot long screen that will monitor the groundwater surface. The shallow monitoring wells will be logged continuously to evaluate potential off Site sources of contamination. The depth of the wells being installed to monitor the lower portion of the shallow sand aquifer will be determined by the EC probe. The well will be installed using the rotary wash drilling method to a depth of 1 foot into the underlying clay to monitor the base of the shallow sand aquifer. The well screen will be 10 feet in length. During the installation of monitoring well MW-201B (deep monitoring well within the shallow sand aquifer), samples for grain size analysis will be collected every 10 feet below 40 feet bgs. The samples will be collected from split spoon samples for the purpose of potential future extraction well design. Otherwise, none of the boreholes drilled to the bottom the shallow sand aquifer will be sampled or logged.

Well locations MW-201C and MW-204C will be deep wells to monitor the base of the intermediate sand aquifer that lies below the shallow sand aquifer. Rotary wash drilling methods will be used to drill these boreholes. A six-inch diameter polyvinyl chloride (PVC) casing will be installed and seated into the clay layer between the shallow and intermediate sand aquifers. After the casing is installed, grouted, and the grout set, the borehole will be continued using rotary wash drilling and sampled by split spoon every 5 feet to the base of the intermediate sand aquifer, which is estimated to extend to approximately 120 feet bgs based on a clay layer that separates the intermediate and deep sand aquifers encountered during previous investigations at the 10th Street Superfund Site. Samples for grain size analysis will be collected at monitoring well MW-201C from the intermediate sand aquifer every 10 feet for the purpose of potential future extraction well design. Once the base of the intermediate aquifer is reached, the bottom of the 10-foot long screen will be placed at the base of the aquifer.

The newly installed monitoring wells will be developed by bailing or pumping groundwater using the procedures described in the FSP.

Groundwater will be sampled from the newly installed wells using low-flow sampling techniques, as described in the FSP. Groundwater samples will also be collected using low-flow sampling techniques from wells MW-103, MW-104, and MW-105; EPA wells

MW-3A, MW-3B, MW3-C, MW-15A, and MW-15B; and EPA piezometers KV-4 and KV-5. Field measurements of groundwater quality parameters, including pH, temperature, conductivity, dissolved oxygen, and oxidation-reduction potential will be collected using a flow-through cell from the purge and sample water at each monitoring well. The turbidity of the water will also be monitored and recorded.

Chemical analyses to be performed on the groundwater samples include BTEXs (SW-846 Method 8021B), PAHs (SW-846 Method 8270C SIM), and selected RCRA metals (arsenic, barium, cadmium, chromium, and lead) (SW-846 Method 6010B). On Site monitoring wells will additionally be analyzed for phenols (SW-846 8270C) and total and weak-acid dissociable (WAD) cyanide by EPA Method 335.3 and Standard Method SM 4500 CN, respectively. Monitored natural attenuation (MNA) parameters to be completed include methane (SW-846 Method 3810), carbon dioxide (SM4500-CO2 D), alkalinity (total/bicarbonate/carbonate) (EPA Method 310.1), ammonia (EPA Method 350.1), total Kjeldahl nitrogen (TKN) (EPA Method 351.2), nitrate/nitrite as nitrogen (EPA Method 353.2), sulfate (EPA Method 300.0), sulfide (EPA Method 376.1), and total and dissolved iron and manganese (SW-846 6010B). The proposed analyses and number of primary and duplicate samples and specific analyses for the groundwater investigation are presented in Table 4-4. Specific groundwater sampling and analytical procedures are discussed in the SAP.

4.1.3.4 Surveying. Field measurements will be made by the B&V field team to locate the soil probe and monitoring well locations before probing and drilling, respectively. A subcontractor will be used to perform ground surveying activities during the RSE field investigation. Required surveying services will be specified in a subcontract document and will include determining the coordinate locations and ground surface elevations for all soil probes and monitoring wells. The test trench will be measured from fixed, above ground Site structures by Black & Veatch field personnel.

The horizontal locations will be surveyed to the Nebraska State Plane datum, which is the North American Datum of 1983 (NAD 83). The ground surface elevations of the soil probes will be based on the North American Vertical Datum of 1988 (NAVD 88). The elevations of the proposed monitoring wells as well as the existing on Site monitoring well elevations will be determined in reference to both the elevation of the existing EPA monitoring well MW-3A and NAVD 88 datum.

TABLE 4-4
SUMMARY OF PROPOSED GROUNDWATER SAMPLE ANALYSES
Columbus Former MGP Site
RSE Work Plan

Analyses to be Performed	Method	Sample Location and Number of Samples per Location					Total Primary/ Duplicate/MS-MSD Samples
		MW-202A/B, MW-203B, MW-204C, MW-205A/B, MW-206B, KV-4, KV-5, MW-15A/B, MW-3A/B/C	MW-201C, MW-103, MW-104, MW-105	MW-201A	MW-201B	MW-203A, MW-206A	
BTEXs ⁽¹⁾	SW-846 8021B	1	1	1/1/0	1/1/0	1/0/1	22/2/2
PAHs	SW-846 8270C SIM	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Phenols	SW-846 8270C	0	1	1/1/1	1/0/0	0/0/0	6/1/1
Total Cyanide	EPA 335.3	0	1	1/1/1	1/0/0	0/0/0	6/1/1
WAD Cyanide	SM 4500 CN	0	1	1/1/1	1/0/0	0/0/0	6/1/1
Methane	EPA 3810	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Carbon Dioxide	SM 4500-CO2 D	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Alkalinity	EPA 310.1	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Ammonia	EPA 350.1	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Nitrate/nitrite nitrogen	EPA 353.2	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Sulfate	EPA 300.0	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Sulfide	EPA 376.1	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Total & Dissolved Iron	SW-846 6010B	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Total & Dissolved Manganese	SW-846 6010B	1	1	1/1/0	1/1/0	1/0/1	22/2/2
RCRA Metals	SW-846 6010B	1	1	1/1/0	1/1/0	1/0/1	22/2/2
Abbreviations:							
3/2/1	primary/duplicate/MS-MSD samples						
BTEXs	benzene, toluene, ethylbenzene, and total xylenes (SW-846 Method 8021B)						
PAHs	polynuclear aromatic hydrocarbons (SW-846 Method 8270C SIM)						
RCRA	Resource conservation and Recovery Act (arsenic, barium, cadmium, chromium, and lead)						
WAD	weak-acid dissociable cyanide						
Notes:							
(1)	A trip blank will be submitted for volatile organics analysis (SW-846 Method 8021B) with each set of samples for BTEX analyses shipped to the laboratory.						
(2)	A duplicate sample, matrix spike and matrix spike duplicate, and field blank will be collected for every 20 primary samples collected in the field. The field blank will be analyzed for BTEXs only.						
(3)	A sample of potable water used during drilling and decontamination activities will be analyzed for BTEXs, PAHs, and selected RCRA metals.						
(4)	Rinse blanks will be collected from decontaminated sampling equipment as specified in the SAP.						

4.1.3.5 Well Inventory/Private Well Survey Review. A review will be completed of existing information regarding the private, industrial, and monitoring wells registered with the State of Nebraska that exist within three city blocks of the Site. Based on the vast amount of data already obtained from the 10th Street Superfund Site, it is not anticipated that an additional well inventory/private well survey will be required.

4.2 Data Analysis/Validation/Evaluation

This task involves the chemical and physical laboratory analyses of samples collected during the RSE field investigation, as well as the validation and evaluation of the generated analytical data. Validation of the chemical analytical data will be performed using the EPA's *Laboratory Data Validation Functional Guidelines for Evaluation Organics/Inorganics Analyses* (EPA 1999 and 1994). Data evaluation activities will include reduction and tabulation of the data for use in evaluating the nature and extent of Site contamination and for presentation in the RSE report.

4.3 Preparation of Reports

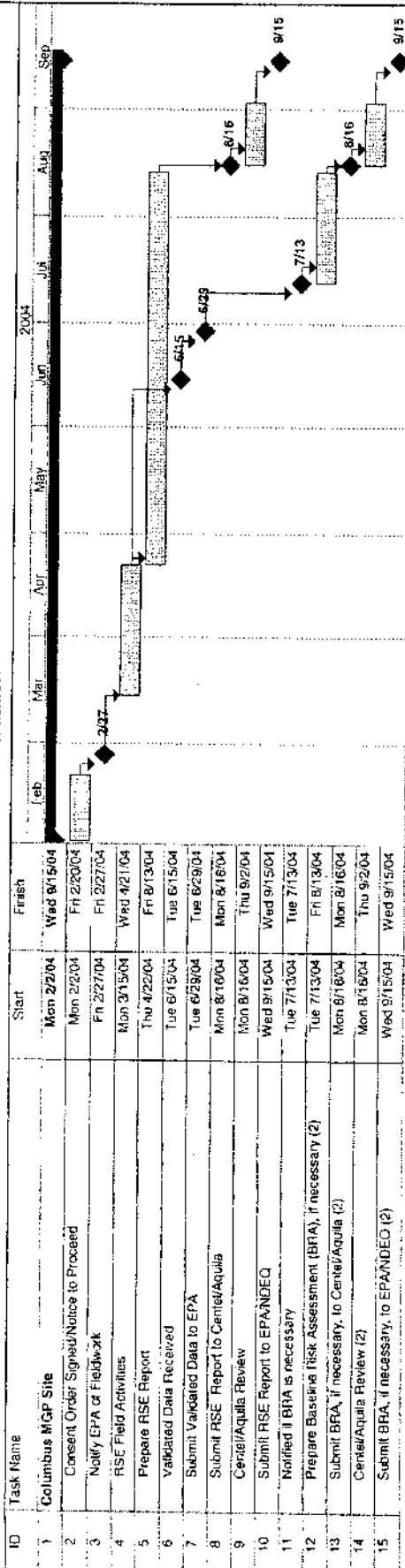
A RSE report will be prepared to document the activities conducted and evaluate the findings of the RSE field investigation. If necessary, a baseline risk assessment will be prepared using the data generated during the RSE and the RSE for Groundwater conducted in May 2003 to evaluate the potential risk to human health and the environment from Site source areas, soil, and groundwater. These reports will be prepared in accordance with the AOC and applicable EPA guidance documents.

5.0 Schedule of Work

Table 5-1 presents the proposed RSE schedule and the schedule for a baseline risk assessment, if it is determined that one is required. The proposed date of start and completion of each task depends on the date the AOC is finalized, and the review and approval of Centel, Aquila, EPA, and the Nebraska Department of Environmental Quality. The schedule also depends on the actual duration of the field work, which may need to be extended if inclement weather or unforeseen conditions are encountered, and the time required to obtain access agreements.

The schedule will be updated monthly, and the updated version will be included in the monthly status report. After the AOC is finalized, the schedule will be set in accordance with the timelines established. The schedule in Table 5-1 presents estimated dates for the start and completion of each task.

TABLE 5-1
COLUMBUS MGP SCHEDULE⁽¹⁾
Removal Site Evaluation



(1) Contingent on beginning RSE field work on March 15, 2004.
(2) Contingent on determining the necessity of the Baseline Risk Assessment by July 13, 2004.

01/26/04; B00004079

6.0 References

- Black & Veatch 2003a. Black & Veatch, *Ground Water Investigation Work Plan, Columbus Former Manufactured Gas Plant Site*, prepared for Centel Corporation, May 2003.
- Black & Veatch 2003b. Black & Veatch, *Removal Site Evaluation for Groundwater Report*; prepared for Centel Corporation, July 2003.
- Brown 1915-1933. *Brown's Directories of American Gas Companies*, 1903-1937.
- City of Columbus 1998. City of Columbus, *Map of the City of Columbus, Nebraska*, City of Columbus Engineering Department, November 1998.
- CDM 2002. CDM Federal Programs Corporation, *Final Basis of Design Report for the 10th Street OU2 Site: Columbus, Platte County, Nebraska*, prepared for USEPA Region 7 Superfund Branch, October 2002.
- EPA 1988. U.S. Environmental Protection Agency, *U.S. Production of Manufactured Gases Assessment of Past Disposal Practices*, USEPA/600/2-88/012, February 1988.
- EPA 1992. U.S. Environmental Protection Agency, *Dermal Exposure Assessment: Principals and Applications, Interim Report*, EPA/600/8-91/011B, January 1992.
- EPA 1994. U.S. Environmental Protection Agency, *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA/540/R-94/013, February 1994.
- EPA 1995. U.S. Environmental Protection Agency, Region 3, *Technical Guidance Manual, Risk Assessment, Assessing Dermal Exposure from Soil*, EPA/903-K-95-003, December 1995. EPA 1995. U.S. Environmental Protection Agency,
- EPA 1999. U.S. Environmental Protection Agency, *Contract Laboratory Program National Functional Guidelines for Organic Data Review*, EPA/540/R-99/008, October 1999.
- EPA 2003. U.S. Environmental Protection Agency, *Administrative Order on Consent for Engineering Evaluation/Cost Analysis*, Docket No. CERCLA-07-2003-0307.
- HDR 1992. HDR Engineering, Inc., *Former CENTEL, Inc. Manufactured Gas Plant Site Draft Site Investigation Report*, prepared for Minnegasco, Inc., October 1992.

Tinkham 2003. Tinkham Land Surveying, Survey Results completed May 2003.

USGS 1976. U.S. Geological Survey, 7.5 minute series Topographic Quadrangle Map of Nebraska, Columbus Quadrangle, 1976, Scale 1:24,000.

Appendix A
Sampling and Analysis Plan
(FSP and QAPP)

FIELD SAMPLING PLAN

Columbus Former Manufactured Gas Plant
Site
1169 22nd Avenue
Columbus, Nebraska 68601

Prepared for
Centel Corporation
For Submission
To EPA / NDEQ

January 2004

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Columbus MGP Site

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1.0 Introduction

Black & Veatch has been retained by Centel Corporation to conduct a removal site evaluation (RSE) at the Columbus former manufactured gas plant (MGP) site in Columbus, Nebraska, herein referred to as the "Site". The following sections describe the elements of the Field Sampling Plan (FSP) to be implemented while performing the field activities. The FSP will be used by field personnel in conjunction with the work plan to further define the following:

- Sampling objectives.
- Sample locations and frequency, including quality control samples.
- Sample numbering system.
- Investigative techniques and methodology.
- Sampling equipment and procedures.
- Decontamination procedures.
- Sample containers, preservative, shipping, and holding time requirements.
- Sample analyses and documentation.
- Procedures for handling investigation-derived wastes.

Site background information is provided in the Work Plan. A Quality Assurance Project Plan (QAPP) is also included in this Appendix.

2.0 Sampling Objectives

The RSE field activities will consist of excavating test trenches, advancing soil and electrical conductivity probes, drilling borings, installing monitoring wells, collecting soil and groundwater samples for chemical analysis, collecting soil samples for physical analysis, and surveying the locations of the probes advanced and monitoring wells installed during this investigation. The overall objective of the RSE investigation is to evaluate the nature and extent of source and contaminated soil contamination as well as to obtain additional data regarding groundwater conditions.

3.0 Sample Location and Frequency

Soil sampling locations were selected to evaluate the nature, extent, and characteristics of the source material and soil on Site. Groundwater sampling locations were selected to provide data on the groundwater conditions to evaluate the baseline conditions prior to the groundwater remedial activities being conducted at the EPA 10th Street Superfund Site. The following subsections describe the location and frequency of sample collection. A more detailed description of sample rationale is contained in the RSE Work Plan.

3.1 Soil Investigation Procedures

This section describes the trenching, hydraulic probing, and logging and sampling activities that will be completed during the soil investigation portion of the RSE.

Prior to conducting any trenching or hydraulic probing on Site, the Nebraska's Digger Hotline (800-331-5666) will be contacted to conduct an utility location survey to mark any buried utilities in the proposed areas of work. In addition, the assistance of the current facility operator (Aquila) will be requested to identify and mark any buried utilities on the Site.

3.1.1 Test Trench Excavation Procedures

The test trenches to locate the structure walls of the portions of the gas holder, tar tanks, and gas tank that may potentially be below grade will be excavated using a backhoe or trackhoe. These trenches are being completed to locate the structure walls, to determine the horizontal extent of the below grade structure, and to locate the planned probe inside the structure. No soil samples will be collected from the test trenches. If visibly contaminated material is encountered or the soil exhibits a hydrocarbon odor, an effort will be made not to remove it from the trench and the trench will not continue vertically into the contaminated material. Areas of the test trench that do not encounter visibly contaminated material will be limited to a depth of 5 feet and the lateral extent of the trench will be limited to the below grade structure walls. The test trenches will be logged to record and describe the materials encountered in the excavation on the test trench log form that is included in Attachment A. The log of the test trench will be completed as described in the Black & Veatch Geotechnical Field Guide for Site Investigations. Soil and debris excavated during the test trench activities will be returned to the trench as described in the work plan.

Ambient air conditions will be monitored during excavation using a PID, which will also be used to monitor organic vapors in the breathing zones of field personnel. Detailed ambient air monitoring information is provided in the Site health and safety plan.

3.1.2 Hydraulic Probing and Sampling Methods

The soil probes will be advanced using hydraulic direct-push probing methods. The probes will be advanced using a track-mounted or truck-mounted Geoprobe® rig or equivalent using 4-foot long sample barrels and probe rods. Each sample barrel will be fitted with an unused, new 4-foot long acetate liner prior to each sampling push to prevent cross-contamination during soil sampling. The soil probes advanced on Site will be continuously sampled and logged by a geological engineer or geologist. The probe log form that will be used is included in Attachment A.

The soil probes will be advanced to a maximum depth of 16 feet below ground surface (bgs), except when a possible structure base has been encountered (e.g., probe refusal). When probe refusal is encountered below a zone of contamination indicating a possible structure base, the probe will be terminated so as not to penetrate the structure base. If probe refusal is encountered above 6 feet bgs and contamination is not present in the overlying soil, an attempt will be made to probe through the refusal zone to determine if a cover is present on the structure or if the difficult probing is due to an isolated debris or rubble layer. Whenever probe refusal is encountered (below a contaminated zone or in a zone that can not be penetrated by the probe), the probe will be offset to verify refusal.

All probe holes will be backfilled with bentonite grout or bentonite chips, and the original surface restored.

No grease or other lubricants will be used on the probe sample barrel, rods, or on tools required to advance the probe. Fluids and soil cuttings generated during the probing will be collected and containerized as described in the Section 4.0.

Ambient air conditions will be monitored during the probing using a PID, which will also be used to monitor organic vapors in the breathing zone during probing activities. Detailed ambient air monitoring information is provided in the Site health and safety plan.

3.1.3 Soil Sampling

Two primary soil samples will be collected from each probe advanced during this investigation, with the exception of probes SP-1, SP-2, SP-16, SP-21, SP-24, and SP-25. Samples will be collected from the most visibly contaminated zone in the 1 to 6 foot and 6 to 12 foot bgs intervals, as described in the work plan. Three samples will be collected from probes SP-1, SP-2, SP-16, SP-21, SP-24, and SP-25 from the 0.5 to 1 foot bgs interval, in addition to the most visibly contaminated zone in the 1 to 6 foot and 6 to 12 foot bgs intervals.

Once the acetate liner is extracted from the sample barrel, the liner will be cut open with a utility knife to log the soil sample and to collect PID readings along the soil core. The percent recovery of the soil will be recorded. A clean stainless steel spoon or knife will be used to remove the soil from the sample liner and to directly place the soil into the appropriate sample containers. A clean pair of nitrile gloves will be worn while collecting the sample.

All of the soil samples collected will be analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEXs), polynuclear aromatic hydrocarbons (PAHs), selected RCRA metals (arsenic, barium, cadmium, chromium, and lead), and cyanide. In addition, the soil samples collected from probes SP-11, SP-12, and SP-13 will be analyzed for phenols. The BTEX portion of the sample will be collected first to minimize volatilization. Following collection of this portion, the semivolatile organics and inorganics analyses will be collected. The analytical methods to be performed are specified in the work plan and discussed in the QAPP.

3.2 Groundwater Investigation Procedures

This section describes the hydraulic probing, borehole drilling and logging, and monitoring well installation activities that will be completed during the groundwater investigation portion of the RSE.

Prior to conducting any probing or borehole drilling off Site, the Nebraska's Digger Hotline (800-331-5666) will be contacted to conduct an utility location survey to mark any buried utilities in the proposed locations of the monitoring wells. In addition, the assistance of Union Pacific Railroad will be requested to identify and mark any buried utilities on the railroad property.

3.2.1 Electrical Conductivity Probing

Electrical conductivity (EC) probes will be advanced at each proposed well/well nest location to accurately determine the depth to the base of the shallow sand aquifer to facilitate well installation. The EC probes will be advanced using a track-mounted or truck-mounted Geoprobe® rig or equivalent and the system will consist of a SC400 "Wenner" type array, soil conductivity probe, and an FC4000 field computer.

The EC probe holes will be backfilled with bentonite grout or bentonite chips, and the original surface restored.

3.2.2 Borehole Drilling/Monitoring Well Installation Procedures

Following the advancement of the EC probe at each well/well nest location to determine the base of the shallow sand aquifer, the monitoring wells will be installed using a truck-mounted drilling rig using hollow stem augers (HSA) and rotary drilling techniques.

The five wells being installed to monitor the upper portion of the shallow sand aquifer will be drilled to a total depth of 20 feet using 8-inch outer diameter (OD), 4 1/4-inch inner diameter HSA. These holes will be continuously sampled and logged. The shallow monitoring well will be installed through the HSA. The filter pack and bentonite seal (discussed in subsection 3.2.3) will be placed in the annular space while the HSA are pulled from the borehole.

The five wells installed to monitor the base of the shallow sand aquifer will be drilled using rotary wash. A 6-inch diameter hole will be rotary drilled through the shallow sand aquifer and will terminate 1 foot into the underlying clay unit, as identified in the EC probe. The soil in these boreholes will not be sampled, with the exception of boring MW-201B in which split spoon samples for physical analysis will be collected at 10 foot intervals starting at 40 feet bgs to the base of the shallow sand aquifer. This sampling is being completed to collect samples of the sand for grain size analysis, which will be used for any potential future extraction well design. The screened interval for these monitoring wells are estimated to be at 60 to 70 feet bgs, but will depend on the depth of the bottom of the shallow sand aquifer as determined by the EC probing. The well screens will be installed to the base of the shallow sand aquifer across the interface with the underlying clay unit.

The two wells being installed to monitor the intermediate aquifer that is separated from the overlying shallow sand aquifer by a clay unit will be double-cased to prevent cross-contamination between the aquifers. A 10-inch diameter borehole will be rotary drilled through the shallow sand aquifer and 1 foot into the underlying clay unit. This depth will be determined by the EC probe. A 6-inch diameter polyvinyl chloride (PVC) National Sanitation Foundation (NSF)-certified casing will be set to the base of the borehole and the casing will be grouted into place with bentonite grout. After allowing the bentonite grout to set for 12 hours, a 6-inch diameter borehole will be rotary drilled below the casing through the clay unit and to the base of the intermediate sand aquifer (approximately 120 feet). The geology of the intermediate sand aquifer will be logged by sampling every 5 feet with a standard split spoon sampler. During the installation of monitoring well MW-201C, samples for grain size distribution will be collected from the split spoons driven into the intermediate sand aquifer every 10 feet for potential future extraction well design. The hole will be terminated when the underlying clay unit is reached, indicating the base of the intermediate sand aquifer. The bottom of the 10-foot long screen will be placed at the base of the intermediate sand aquifer.

3.2.3 Monitoring Well Construction

Each monitoring well will be constructed of new PVC pipe and screen sections joined using flush-threaded joints. No solvents or lubricants will be used during well construction. Immediately following the removal of the well casing and screen from the factory-sealed plastic packaging, the well will be installed in the borehole. If the well materials come into contact with the ground surface, they will require decontamination as described in Section 3.5. Clean gloves will be used when installing the PVC riser pipe and screen for each well. The riser pipe for the monitoring wells will be a 2-inch diameter, Schedule 40, NSF-certified PVC pipe. The screened section will be factory-slotted, Schedule 40, NSF-certified, 2-inch diameter PVC pipe with 0.010-inch-wide slots. The length of the screened interval for each well will be 10 feet. A 2 to 6-inch blank PVC riser pipe will be installed below the bottom of the screen as a silt trap. A flush-threaded cap will be installed at the bottom of the well, and a watertight expandable locking cap will be provided for the top of the riser pipe. Well construction diagrams for single-cased and double-cased monitoring wells are presented on Figures 3-1 and 3-2, respectively. The monitoring well construction log form to be used to document each well installation is included in Attachment A.

Washed silica sand will be used as a backfill, acting as a filter around the screened section, and extend approximately 2 feet above the top of the screened section. A 3-foot long bentonite pellet, or chip seal will be installed directly above the filter pack, if possible.

Above the bentonite pellet or chip seal or above the filter pack where a bentonite pellet or chip seal could not be installed, the entire length of the annulus will be backfilled with a bentonite grout slurry to approximately 1 foot bgs. The grout will be thoroughly mixed and placed in the annulus using the tremie method. A concrete apron will be placed below the ground surface to secure the protective casing that will be installed around the riser pipe. The concrete at the surface will be formed, preferably with a Sonotube®, to create a pad around the protective steel casing.

The monitoring wells will be constructed flush with the ground surface. The riser pipe will be cut 2 to 3 inches bgs and a PVC slip cap will be temporarily placed on the riser pipe to prevent deleterious materials from entering the well during the completion activities. A protective casing, consisting of a flush mounted cast-iron surface completion will be installed. Free drainage will be maintained by sloping concrete placed at the surface away from the cover. Upon completion, a lockable PVC cap will be placed on the well casing.

3.2.4 Well Development

Well development will be performed to eliminate or minimize the disturbance of the ground water system caused by drilling and well installation; to remove water introduced into the formation during drilling and well installation; and to reduce the turbidity of ground water samples obtained from the monitoring well. Inadequate or improper well development may affect the quality of samples collected from the well. Well development must take into account well construction and formation hydrogeologic characteristics. These factors will be evaluated by a geologist or geological engineer to determine the proper well development procedure. Well development will be performed by field personnel or by the subcontractor under the supervision of field personnel.

Newly installed monitoring wells will be developed no sooner than 12 hours after the annular seal has been placed and at least 48 hours before ground water sampling is planned. Well development will be performed by surging and bailing or pumping. The well will be surged by raising and lowering the bailer or pump throughout the screened portion of the well. Development should be sufficiently vigorous to restore the well-aquifer system's

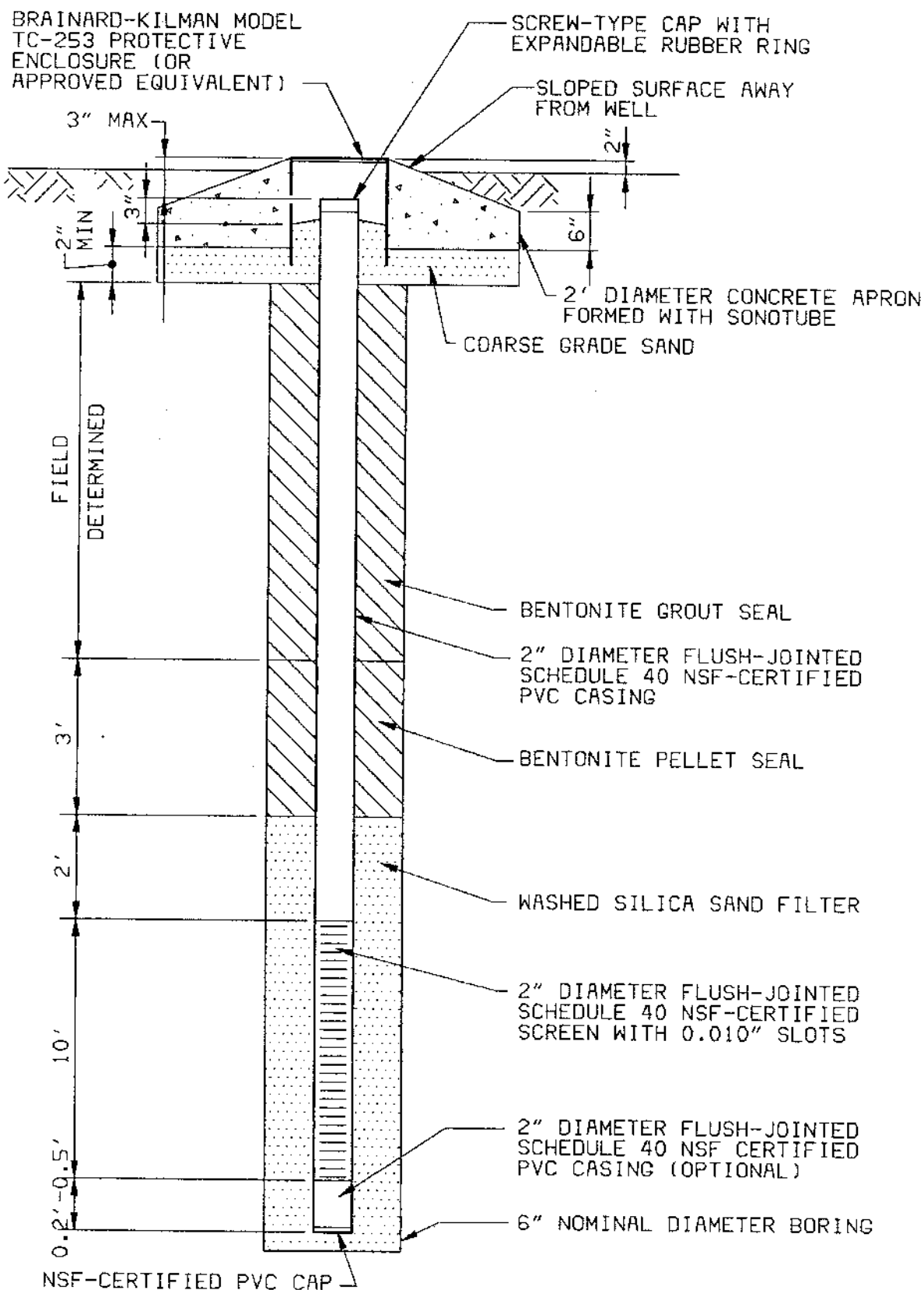
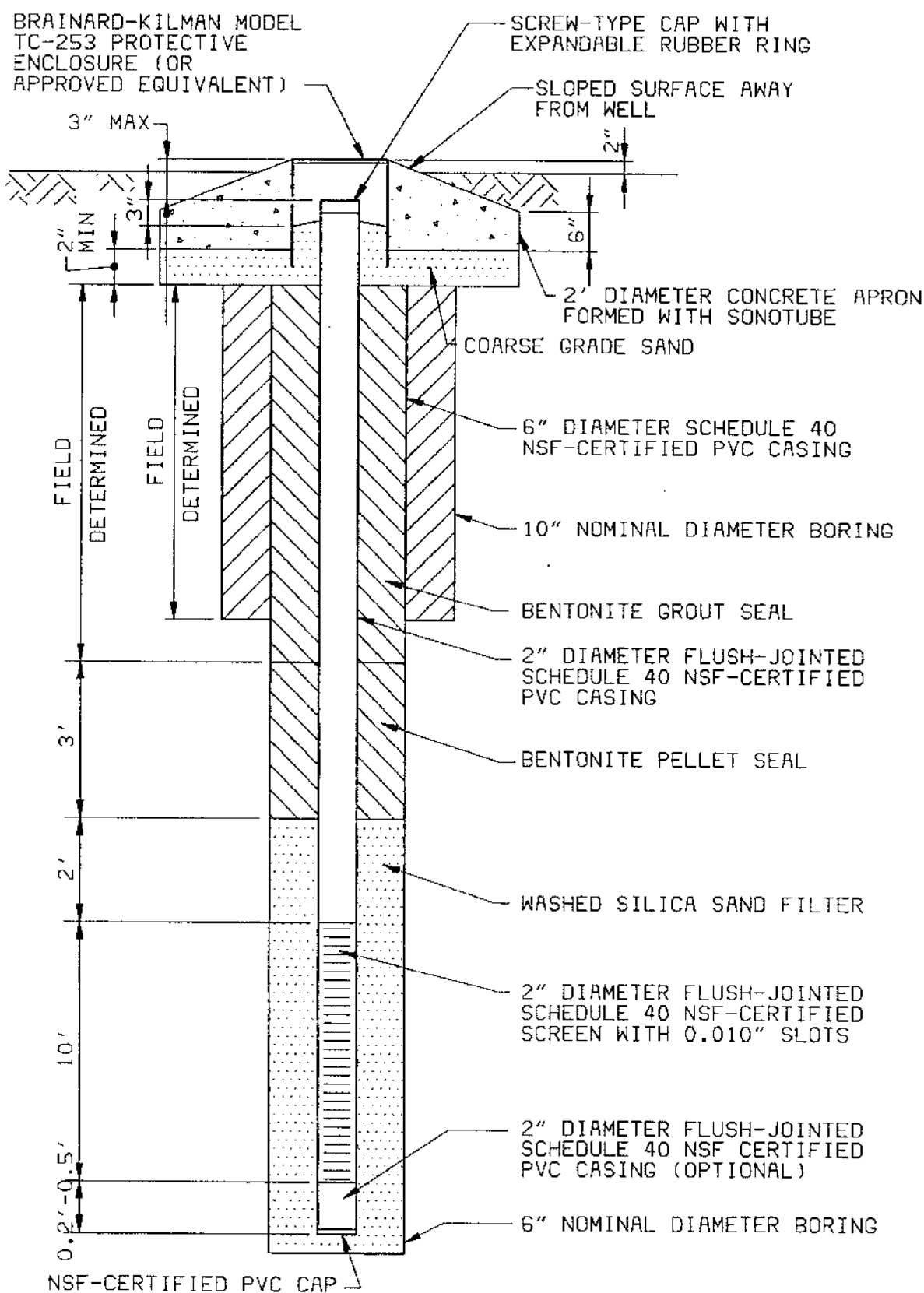


FIGURE 3-1
TYPICAL FLUSH-MOUNTED
SINGLE-CASED MONITORING WELL
FIELD SAMPLING PLAN
65310-1101-A088-550-C-8000031YK4



NOT TO SCALE

FIGURE 3-2
TYPICAL FLUSH-MOUNTED
DOUBLE-CASED MONITORING WELL
FIELD SAMPLING PLAN
65310-1101-A09B-550-C-800003YKN

hydraulic efficiency, yet performed in a manner that prevents damage to the filter pack. Monitoring wells will be developed until the discharge water is free of sediment and a minimum of five well volumes of water in addition to the volume of water introduced to the monitored formation during drilling and well installation have been removed.

The well will be pumped at a continuous rate when pumping is performed. A uniform discharge rate, which depends on the aquifer characteristics, will be maintained to minimize turbulent flow. The continuous removal rate will be carefully documented for wells to ensure this rate is not exceeded during subsequent purging and sampling of the well.

Field personnel will record the fluid volume removed, removal rate(s), and change in groundwater appearance over time. Field parameters, including temperature, pH, specific conductivity, and turbidity, will be monitored at the start of development, periodically during development, and at development completion. This information will be recorded on a well development data sheet. An example form is found in Attachment A.

3.2.5 Groundwater Purging and Sampling for Chemical Analysis Using Low Flow Techniques

Before sampling each monitoring well, an oil/water interface probe with permanent 0.01-foot markings will be used to measure static fluid levels. Wells equipped with an expandable-ring well plug will be opened and vented for a minimum of 1 hour before fluid levels are measured to allow static groundwater levels to equilibrate. The following procedure will be used by the field personnel in obtaining fluid level measurements:

1. Before use in the field, the probe will be turned on, and the probe end will be inserted in a glass of potable water to check probe batteries. Instrument response will be noted as the tip of the probe contacts the water. If no response occurs, the batteries will be replaced and checked again. The batteries will be checked by pressing the test switch each day that well measurements are taken.
2. Before placing the probe in the well, the portion of the cable that will enter the probe or well will be washed with laboratory detergent and potable water and rinsed with distilled water.
3. The probe will be lowered into the well by pulling the cable from the hand-held reel until the light comes on or buzzer sounds.
4. The cable will be moved up and down while the indicator is observed, and the exact length of cable extended from the zero datum of the probe to the survey

notch or permanent mark at the top of the well casing will be noted to the nearest 0.01 foot. This process should be repeated three times to verify the water level in the well.

5. Once obtained accurately, the water level, station number, and the time and date of the measurement will be recorded in the field logbook. If possible, the same field crew member will record all fluid level measurements at a site during a single sampling event.
6. In addition, the probe will be used to identify the presence of and measure the amount of light or dense non-aqueous phase liquid (NAPL) on the groundwater surface and at the bottom of each monitoring well.
7. The cable will be decontaminated by spraying it with distilled water and wiping with paper towels as it is rewound onto the reel. Any free product on the probe or cable will be removed with rubbing alcohol and paper towels, followed by rinsing with distilled water and wiping with paper towels. If residue remains, the cable will be washed with laboratory detergent and potable water followed by a distilled water rinse.

Following measurement of static fluid levels and NAPLs, if present, each well will be purged and sampled. A peristaltic or bladder pump will be used to perform low flow purging and sampling in accordance with EPA protocol for low flow sampling (EPA 1996). It is anticipated that a peristaltic pump will be used in the wells that do not contain dedicated bladder pumps (EPA wells). New, unused tubing will be used at each sampling location when using the peristaltic pump. A non-dedicated bladder pump may have to be used if the water level is too low to allow the peristaltic pump to be used efficiently. If a non-dedicated bladder pump is used, any pump parts or associated air tubing exposed to groundwater will be decontaminated between sampling locations and new, unused tubing will be used at each sampling location. In the EPA monitoring wells that will be sampled, the dedicated bladder pumps will be used. This activity will be coordinated with EPA or their consultant.

Before beginning purging of monitoring wells, the pump and/or associated tubing will be lowered into the well to or slightly above the midpoint of the wetted screen interval. A low-flow cell will be set up in line with the pump. Purging will begin at the lowest flow rate, periodically checking to determine if the water level in the well is being drawn down. If not, the flow rate will be increased to a maximum of 1 liter per minute until the water level begins to draw down. At this point, the flow rate will be decreased slightly so as not to cause visible drawdown in the well. After the desired flow rate is established, the well

will be purged until the water quality is within the stabilization criteria bounds set in Table 3-1 for three consecutive readings or after purging for 30 minutes, whichever occurs first.

After purging, the flow cell will be disconnected from the pump before collecting the ground water sample. The flow rate will not be increased when collecting samples, but it may be reduced if necessary. To prevent the degassing of volatile organic compounds, including BTEXs, when using a peristaltic pump and tubing, the volatile fraction (BTEXs) will be collected last. The tubing will be filled with water using the peristaltic pump and the top end of the tubing will be capped/pinched to maintain the vacuum prior to removing the tubing from the pump. The tubing will be removed from the well and the sample container filled from the bottom (formerly submerged) end of the tubing.

TABLE 3-1
STABILITY CRITERIA FOR WATER QUALITY PARAMETERS
MEASURED WHILE PURGING WITH A LOW FLOW PUMP
Columbus MGP Site

Field Parameter	Stabilization Criteria
pH	± 0.1 units
Conductivity	± 3%
Turbidity	± 10% or <10 NTUs
ORP	± 10%
Temperature	± 3%
Dissolved Oxygen	± 10%
Abbreviations: NTUs Nephelometric Turbidity Units ORP oxidation/reduction potential	
Notes: 1. Readings will be collected every 3-5 minutes. 2. The flow rate will be low enough to keep from drawing down the water level and air bubbles to a minimum. 3. Water quality will be considered sufficiently stable when all parameters are within the prescribed bounds for three consecutive measurements. 4. The flow cell will not be used on wells containing free product.	

A groundwater sampling record (Attachment A) will be completed for each well and probe. Water quality measurements will not be recorded for groundwater collected from wells in a condition that would make decontamination of electronic metering equipment difficult.

Once sample containers are filled for analyses, samples will be immediately placed in a cooler or shipping container with ice. Purged fluids will be collected and containerized in accordance with Section 4.0.

3.3 Quality Control Samples

Duplicate soil and groundwater samples will be collected at a rate of one duplicate sample for every 20 primary samples collected for each media. The location and number of duplicate samples are indicated in the work plan.

Rinsate blanks will not be collected during the soil investigation because the soil core retrieved from the probe hole will be in new, unused acetate liners and new, unused stainless steel knives or spoons will be used to transfer each soil sample from the sample liner to the sample containers. This prevents any sampling equipment from coming into direct contact with any other environmental soil samples or subsurface media, which would require decontamination.

One rinsate blank will be collected for every 20 primary groundwater samples collected with the non-dedicated bladder pump, if one is used. The rinsate blank will be collected by pumping deionized water through the decontaminated bladder pump and tubing at a rate typical of the purge rates used at the monitoring wells. The rinsate blank will be analyzed for BTEXs, PAHs, and selected RCRA metals. There will be no rinsate blanks collected when using a peristaltic pump water. Peristaltic pumps require no decontamination because new tubing is used at each sample location and the groundwater does not pass through any of the pump parts.

One field blank will be collected for every 20 primary groundwater samples. The purpose of the field blank is to determine the effect of ambient air conditions on the groundwater samples, if any. The field blank will be prepared by pumping high performance liquid chromatography (HPLC) water into the sample containers using the low flow sampling equipment. The field blanks will only be submitted for BTEX analysis.

The laboratory will prepare trip blanks and ship them to the Site with the empty sample bottles. The trip blanks will not be opened on Site and will be submitted with each shipment of containers holding groundwater samples for BTEX analysis at the offsite laboratory. The trip blanks will only be analyzed for BTEXs to assess whether these

compounds are introduced into ground water samples as a result of conditions encountered during shipment and subsequent handling.

A sample of potable water used during probing, drilling, well installation, and decontamination activities will be analyzed for PAHs, BTEXs, and selected RCRA metals.

The laboratory will perform matrix spike (MS) and matrix spike duplicate (MSD) analyses on designated sample aliquots. The samples for the MS and MSD analyses will be collected from a sampling location that is believed to exhibit low-level contamination. A sample from an area of low-level contamination is needed so that the objective of these analyses, to determine the presence of matrix interferences, can be achieved without unnecessary complications.

3.4 General Sampling Procedures

Information concerning sample containers, preservatives, and holding times, and instructions for sample container filling, packaging, and shipping are provided in this section. The containers, preservatives, and holding times that will be used for this work are in accordance with the standard methods.

3.4.1 Sample Containers, Preservatives, and Holding Times

The following is a general outline for sample containers, preservatives, and holding times:

- All sample containers, packaging, and preservatives will be supplied by the laboratory performing the analyses.
- Sample storage by the laboratory will conform to procedures established by the most recent guidelines.
- Holding times listed in the tables presented in Appendix B will be referenced to the time of sample collection. The tables in Appendix B also presents the sample containers and preservatives to be used throughout the investigation.

3.4.2 Sample Container Filling, Packaging, and Shipping

The following measures will be taken during and after container filling to ensure that the amount of sample residue on the outside of the container is minimized before packaging and shipment:

1. The sample will be transferred directly from the source or sampling device to the sample container by use of a new, unused collection device.
2. The container will be filled to the appropriate level. Care will be taken to avoid spilling the sample on the outside of the container.
3. The lip of the sample container will be wiped clean before capping.
4. The sample container lids will be screwed on firmly without dislodging the lid lining or over-tightening the lids.
5. The outside of the sample container will be wiped clean or, if necessary, will be rinsed clean with distilled water.

Shipping procedures are based on EPA guidance and U.S. Department of Transportation (DOT) Regulations (49 CFR Parts 100 through 199). Samples will be packaged and shipped in containers supplied by the laboratory. Shipping containers provided by the laboratory will include coolers and shipping boxes. Samples will be shipped as non-dangerous goods [media that do not meet reportable quantity (49 CFR Part 172.101, Table 3-2 Appendix) and maximum concentration (49 CFR Part 171.8) limits, and do not fall within any other hazard class (49 CFR Parts 173.50 and 173.115)].

The following general steps will be observed for the packaging and shipping of all samples:

1. Affix completed sample label to the sample container and protect it by covering with clear tape.
2. Arrange pre-chilled sample containers in groups by sample number.
3. Arrange sample groups with assigned shipping containers.

When samples are shipped in coolers, the following steps will be undertaken:

1. Protect each glass sample container with bubble wrap or foam, taped securely in place, as necessary.
2. Place approximately 2 inches of packing material in bottom of cooler for cushioning, as necessary.
3. Line cooler with a large trash bag.
4. Place sample containers inside trash bag in cooler.

5. In sample coolers, place ice packaged in sealable freezer bags, double bagged, on and around the containers for temperature control during shipment. Fill the remaining volume of the cooler with packing material, as necessary.
6. Fill remaining volume of trash bag with packing material, as necessary.
7. Seal trash bag with tape and custody seal (described in subsection 5.4.3).
8. Fill out and sign the sample chain-of-custody record (described in subsection 5.4.2) and indicate the estimated time the shipping container will be relinquished to a courier service, or when the shipping container will be relinquished directly to the laboratory.
9. Separate the copies of the forms. Seal the original form and all but one copy in a sealable plastic bag and tape it to the inside lid of the shipping container.
10. Tape the shipping container drain shut, if necessary.
11. Secure shipping container by making several revolutions with strapping tape or clear plastic tape on both ends.
12. If shipped by courier, place airbill marked for "Next Business Morning" delivery with laboratory address on shipping container.
13. Put "Up Arrow" symbols on the shipping container if shipping liquid samples.
14. Affix custody seals over top front and top back corners of the shipping container. Cover seals with clear plastic tape.
15. Telephone the laboratory and provide the following information:
 - Your name and company (Black & Veatch).
 - Project name.
 - Number and type of samples to be received.
 - Date and estimated time of delivery.
 - Anticipated sampling schedule (for establishing sample delivery groups at laboratory).
16. Maintain a file of all sample documentation with the project engineer.

3.5 Decontamination Procedures

Procedures for equipment decontamination will be implemented to avoid cross-contamination of subsurface strata and samples of various media. The probe and drill rigs

and all sampling tools and equipment will be thoroughly cleaned and decontaminated before initial use.

The initial decontamination will be performed in two separate phases. The first phase of initial decontamination will be performed before moving equipment to the Site. In this phase, the equipment required to perform probing and sampling will be thoroughly cleaned. Any encrusted soil, mud, or organic matter adhering to the equipment will be removed using a high-pressure potable water wash. The equipment and materials subjected to this decontamination phase will include, but not be limited to, the probe and drill rigs, pumps, probe and drill rods, threads, sampling equipment, and other tools and materials required to complete the probes, boreholes, and well installations.

The second phase of initial decontamination will be performed on the Site. The on Site decontamination area will consist of an impermeable base used to collect all wastewater and other potentially contaminated material generated during the decontamination process. All wastewater and any potentially contaminated materials that remain on the pad or in the buckets after the decontamination process is performed will be managed as specified in Section 4.0.

The second phase of initial decontamination will consist of the following:

1. Remove soil with a potable water wash. A high-pressure steam cleaner will be used for the decontamination of drilling equipment.
2. Wash with a Stoddard solvent to remove visible contamination from the equipment, if necessary.
3. Wash with laboratory detergent and potable water.
4. Rinse equipment with clean potable water.

Following completion of decontamination, equipment that touches the ground will be considered contaminated and will require decontamination before use.

Intermediate decontamination of probing equipment will be performed between groundwater probe sampling locations. This equipment will include probe rods, drill rods, sampling equipment, and all other tools and equipment considered contaminated. The

procedure used during the second phase of initial decontamination for drilling equipment will be used during intermediate decontamination. Intermediate decontamination of the sampling equipment will be required between sampling attempts, as well as between different probe locations to prevent cross-contamination of sampling equipment, wells, and probes.

Final decontamination of all equipment used to advance and sample probes will be required before equipment demobilization from the site to prevent the movement of contaminants onto clean areas off of the Site. Final decontamination will be performed at the on Site decontamination area and will be verified by field personnel. Final decontamination will include, at a minimum, the probe and drill rigs, sampling equipment, and any tools used. The procedures used during intermediate decontamination will be utilized during final decontamination.

3.6 Surveying

Surveying will be conducted by a registered land surveyor after drilling, probing, and monitoring well installation have been completed. Probe locations will be surveyed to establish coordinate locations and ground surface elevations. The surveyor will also determine coordinate locations, top-of-well casing elevations, and ground elevations of all newly installed monitoring wells and may confirm elevations of existing wells. Coordinate locations will be established from a local benchmark with elevations referenced to mean sea level datum. The acceptable tolerances for elevations and coordinates will be 0.01 and 1.00 foot, respectively.

4.0 Field Investigation-Derived Wastes

Investigation-derived wastes (IDWs) may include soil cuttings, plastic sheeting, decontamination fluids, groundwater removed from wells during development and purging, source materials removed during sampling, disposable sampling equipment, and disposable health and safety materials. Responsibility for the disposal of IDW will rest with Centel Corporation. Procedures for the handling of these wastes and labeling of drums are discussed in the following sections.

4.1 Solid Materials Containerization

Soil cuttings, plastic sheeting, contaminated disposable sampling equipment that cannot be reasonably decontaminated, and contaminated disposable safety and health materials will be segregated according to material type and placed into DOT Specification 17-H open-head 55-gallon drums or roll-off boxes. Disposable sampling equipment and safety and health materials that are not visibly contaminated will be double-bagged in plastic bags and will be disposed of on the Site at a location where municipal solid waste is disposed (i.e., facility dumpster if given approval by Aquila, roll-off box).

After completion of the field activities, composite soil samples will be collected from the containerized soil cuttings that will be stored at the Site. The samples will be analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), selected RCRA metals, and cyanide. The soil will be managed depending on the analytical results in accordance with applicable regulations.

4.2 Liquid Materials Containerization

Decontamination fluids and groundwater removed from wells during purging and sampling will be placed in DOT Specification 17-H open-head 55-gallon drums or PVC holding tanks. When a drum is filled, at least 6 inches of freeboard will be allowed, and the drum will be equipped with a new gasket. Both of these measures will prevent inadvertent spilling during drum handling. At completion of filling, these drums will be closed and tipped in a safe manner to a 45-degree angle to verify the presence of a leakproof closure.

After completion of the field activities, composite water samples will be collected from the containerized water and analyzed for VOCs, SVOCs, selected RCRA metals, and cyanide. The fluids, which will be stored on the Site, will be managed depending on the analytical

results of the samples. All IDW containers will be stored in locations approved by Aquila personnel. All IDW containers will be removed from the site within 30 days of the completion of the data validation.

4.3 Container Labeling

The following information will be placed on both the side of each DOT specification container.

- Site Location (e.g., Columbus MGP)
- Sampling Location (e.g., Probe SP-02)
- Type of Waste (e.g., Soil Cuttings)
- Date of Investigation (e.g., 09/03)

This information will be written legibly by paint pen. Each 55-gallon drum will also be labeled. The label should be placed on the side of the drum about 6 inches below the drum lid. Container labeling information should be documented by field personnel in accordance with the procedures.

5.0 Field Investigation Documentation

Documentation procedures are a vital aspect of any environmental field investigation. Each sample or field measurement must be properly documented to facilitate timely, correct, and complete analysis. Proper sample documentation and custody procedures must be followed to identify, track, and monitor each sample from the point of collection through final data reporting and to help ensure that the data are scientifically and legally defensible.

This section discusses the following aspects of field investigation documentation: field logbook, photographs, sample numbering system, sample documentation and custody, corrections to documentation, probe and boring logs, trench logs, and well construction logs.

5.1 Field Logbook

An important aspect of field investigation documentation is thorough, accurate record keeping. All information pertinent to a field survey or sampling event will be recorded in a bound logbook with consecutively numbered pages. All entries in logbooks and on sample documentation forms will be made in waterproof ink, and corrections will consist of lineout deletions that are initialed and dated. Entries in the logbook will include the following, as applicable:

- Name and title of author, date and time of entry, and physical/environmental conditions during field activity.
- Names and telephone numbers of field contacts.
- Names and responsibilities of field crew members.
- Names and titles of any visitors.
- Location, description, and log of any photographs.
- References for all sampling site maps and photographs.
- Information concerning sampling changes, schedule modifications, and change orders.
- Information concerning field decisions.

- Details of the sampling location (documentation sketches of sampling locations may be appropriate).
- Date and time of sample collection.
- Weather conditions.
- Field observations.
- Any field measurements made (e.g., pH, specific conductance, temperature, depth to water).
- Calibration and maintenance information concerning field analytical and monitoring equipment.
- Sample identification number(s) and the respective description of the sample.
- All sample documentation, including chain-of-custody record numbers and airbill numbers.
- Summary of daily tasks and documentation on any changes dictated to scope of work by field conditions.
- Any procedural steps that deviate from those outlined in this FSP and in the work plan.
- Signature of the person responsible for observations and date.

Because sampling situations vary widely, the exact information that must be entered in a logbook will also vary accordingly. However, the logbook will contain sufficient information to reconstruct the sampling activity without reliance on the collector's memory. During the investigation, the logbooks will be kept in the field team members' possession or in a secure place. Following the investigation, the logbooks will become a part of the final project file.

5.2 Photographs

Any photographs of field activities or sampling locations will show the surrounding area and reference objects. Logbook entries of photographs will include the following five items of information: field personnel's initials, roll number, frame number, date, direction of photograph, and a brief description of the subject of the photograph.

Example: MKM, 1-2, 04-31-03, looking southwest at groundwater sampling activities, Monitoring Well MW-103.

5.3 Sample Numbering System

A sample numbering system will be used to identify each sample submitted for chemical analyses. The purpose of this numbering system is to assist in tracking samples and to facilitate retrieval of sample data. The sample identification numbers for each sampling effort will be used on sample labels, chain-of-custody forms, and all other applicable documentation used during the sampling activity. The field representative will maintain a listing of all sample identification numbers in the field logbook.

Sample identification numbers will consist of four components: a sample location code, a sample type code (for each sample collected at the sample location), a date code, and a sample characteristic code. The following is an example of a completely numbered sample, with each component identified:

SP01-S01-7-8-D

where,

SP01	Soil probe 1,
S	Soil sample
01	Sample 1
7-8	Depth sample collected from, and
D	Duplicate Sample.

The sample location code (SP01) will vary, depending on whether samples are collected from soil probe (SP) or monitoring well (MW) locations, potable water (PW) supply, or characterization sample from a drum (CHAR). The sample type code (S) will vary depending on whether the sample is water (W) or soil (S). The sample depth will vary, as multiple samples will be taken from each soil probe. The sample characteristic code will indicate whether the sample is primary (P), duplicate (D), matrix spike (MS), matrix spike duplicate (MSD), rinsate blank (RB), field blank (FB), or trip blank (TB). The sample numbers and the description of the sample will be recorded in the field logbook.

Each sample collected must be assigned a unique sample number. The sample numbers will change when the medium or the location changes, but will not when different analyses are

requested. For example, a groundwater sample collected at the same location, date, and time for BTEX and PAH analyses would all have the same sample number, although the sample aliquots would be collected in different containers.

5.4 Sample Documentation

The following subsections describe the sample documentation and procedures for completing these documents at the site. Each groundwater sample collected will be properly documented by following these procedures.

5.4.1 Sample Labels

The following information will be included on each sample label:

- Site name/client.
- Sample number.
- Sample collection date and time.
- Analysis requested.
- Preservatives.

Information known before field activities (i.e., Site name, sample numbers, etc.) may be preprinted on the sample labels. Extra sample labels may be prepared for cases when separate containers must be submitted for individual analyses of a sample. Standard laboratory labels or Black & Veatch sample labels can be used.

5.4.2 Chain-of-Custody

A chain-of-custody form will be completed for each shipment of samples. After completion of the chain-of-custody form, the top copy of the chain-of-custody form, bearing the original signature will be enclosed in a plastic bag and secured to the inside of the cooler lid. A copy of the original custody record will be retained for the project files.

Shipping containers will be secured and custody seals will be affixed across container openings. As long as the custody forms are sealed inside the sample cooler and the custody seals remain intact, commercial carriers are not required to sign the custody form. An example chain-of-custody is included in Attachment A.

5.4.3 Custody Seals

Custody seals will be used to ensure the integrity of the samples from the time they are relinquished by the sampling team to a delivery service until they are opened in the laboratory. All samples will be shipped in an insulated container sealed with at least two custody seals. The seals must be attached to the container so that it is necessary to break them to open the sealed container.

5.4.4 Sample Receipt Form

A sample receipt form will be completed when split samples are requested. After completion of this form, the original copy, which is to be signed by field personnel and the sample recipient, is retained for the project file, and a copy is given to the sample recipient.

5.4.5 Airbill

An airbill will be completed for each day that samples are to be shipped by air. More than one shipping container may be shipped under one airbill. When the containers are relinquished to the delivery service, additional information will be added to the airbill by an employee of the delivery service, and a copy of the airbill will be given to the field representative. This copy will be retained for the project file.

5.4.6 Sample Documentation Procedures

The following itemized list will be used as a general reference for completion of the sample documentation:

- Make or obtain a list of the samples to be packaged and shipped that day.
- Determine the number of shipping containers required to accommodate the day's shipment. This is based on the number of samples to be shipped, the number of containers for each sample, and the number of sample containers that will fit in each shipping container.
- Complete the airbill(s) and enter the airbill number(s) on the chain-of-custody record.
- Assign a chain-of-custody record to each shipping container and determine which sample containers will be shipped in each shipping container. (Note: More than one chain-of-custody form may be needed to accommodate the number of samples to be shipped in one container; a separate chain-of-custody form is needed for each container).

- Complete the chain-of-custody form based on the sample containers assigned to each form.
- Assemble the paperwork associated with each container into separate groups and fasten each with a clip.
- Obtain full signature or initials of each field team member on the appropriate paperwork.
- Package samples for shipment.

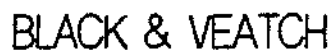
5.5 Corrections to Documentation

Except under adverse weather conditions, all original data and information will be recorded in waterproof ink. If an error is made on a document, it will be corrected by drawing a line through the erroneous statement and entering the correct information. The erroneous information should not be obliterated. Any error discovered in a document should be corrected by the person who identified the error. All corrections must be initialed and dated.

6.0 References

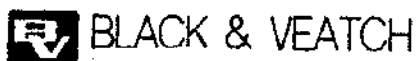
EPA 1996. U. S. Environmental Protection Agency, Robert W. Puls and Michael J. Barcelona, *Low Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, EPA/540/S-95/504, April 1996.

Attachment A
Example Field and Sample Documentation Forms



TEST PIT NO.
SHEET OF

[illegible]



LOG OF BORING

BORING NO.

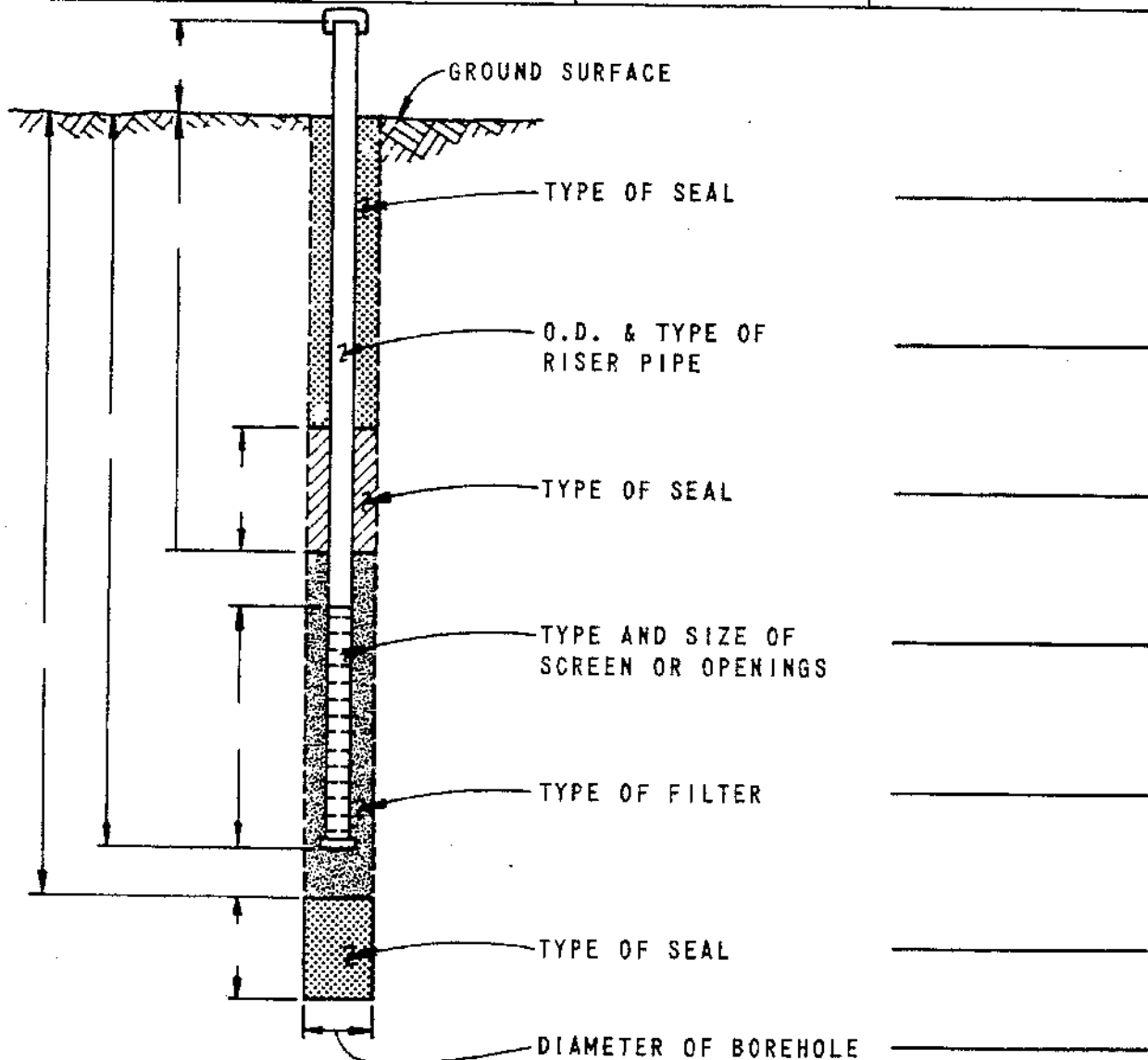
SHEET OF

CLIENT										PROJECT										PROJECT NO.	
PROJECT LOCATION					COORDINATES					ELEVATION (DATUM)					TOTAL DEPTH					DATE START	
SURFACE CONDITIONS																	DATE FINISH				
SAMPLING										DRILLING CONTRACTOR											
SAMPLE TYPE	SAMPLE NUMBER	SET 6"	2ND 6"	3RD 6"	N VALUE	SAMPLE RECOV.					DRILL RIG	DRILLER	INSPECTOR								
							CHECKED BY					APPROVED BY									
CORING										CLASSIFICATION OF MATERIAL										REMARKS	
CORE SIZE	RUN NUMBER	RUN LENGTH	RUN RECOV.	RQD RECOV.	PERCENT RECOV.	RQD	DEPTH IN FEET	SAMPLE TYPE	LOG												
							1														
							2														
							3														
							4														
							5														
							6														
							7														
							8														
							9														
							0														
							1														
							2														
							3														
							4														
							5														
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							0														
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							3														
							4														
							5														
							6														
							7														
							8														
							9														
							0														

**BLACK & VEATCH****PIEZOMETER INSTALLATION LOG**

PIEZOMETER NO. _____

CLIENT _____		PROJECT _____		PROJECT NO. _____
PROJECT LOCATION _____		COORDINATES _____	GROUND ELEVATION _____	DATE _____
STRATUM MONITORED _____			INSPECTOR _____	
CHECKED BY _____		APPROVED BY _____		
DRILLING CONTRACTOR _____		DRILL RIG _____	DRILLER _____	



METHOD OF INSTALLATION:

REMARKS:

Page of

Facility Name: _____ Date: _____

Date: _____

Well I.D. _____ Well Depth _____ Well Dia. _____ Depth to GW _____

Depth to GW

Water Column Height

Water Column Height

Type of Sampler/Equipment: _____

Weather Conditions:

Notes:

[illegible]

Black & Veatch

A27100001

130937.411

Page _____ of _____

Notes:

100

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[illegible][illegible]

Black & Veatch



environmental
testing company
3000 WESTON PKWY.
CARY, N.C. 27513

CHAIN OF CUSTODY RECORD

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☒ RCRA ☐ OTHER

NO: 28176

COMPANY


BLACK & VEATCH

Page 1 of 1

PROJECT #		PROJECT NAME		STATION LOCATION		CONTAINER # OF		MATRIX		REQUESTED PARAMETERS	
40492.138		IES - MUSCATINE FMP SITE									
SAMPLERS: (SIGNATURE)		SAMPLERS: (SIGNATURE)									
A.B. Cedarman		A.B. Cedarman									
SAMPLE I.D.	DATE	TIME	DATE	TIME	STATION LOCATION	CONTAINER #	MATRIX	PHYS (830)	BENTX (8020)	BASE (7060)	BASE (7060)
	4/27/94	1200	X		MU-MW9A-W03-P	7	WATER	X	2	1	1
	4/27/94	1310	X		MU-MW9B-W03-P	7	WATER	X	2	1	1
	4/27/94	1420	X		MU-MW10A-W03-P	7	WATER	X	2	1	1
	4/27/94	1530	X		MU-MW10B-W03-P	7	WATER	X	2	1	1
A.B. Cedarman 4/27/94											
IEA QUOTE NO.											
IEA RUSH NO.											
PROJECT MANAGER (PLEASE PRINT)											
P.O. NO.											
S.O. CRATES											
40492.138-1											

REMARKS ON SAMPLE RECEIPT		IEA REMARKS		FIELD REMARKS	
<input type="checkbox"/> BOTTLE INTACT	<input type="checkbox"/> CUSTODY SEALS			FED. EX. AIRBILL NO.	
<input type="checkbox"/> PRESERVED	<input type="checkbox"/> SEALS INTACT			9181216413	
<input type="checkbox"/> CHILLED	<input type="checkbox"/> SEE REMARKS				

Package No. _____ Sample I.D. _____
 Sample No. MU-MW9A-W03-P

 **WARNING:** This bottle contains sodium azide.
 Do not get on skin, in eyes, or on clothing.
 In case of contact, flush area with water for
 15 minutes while removing any contaminated clothing.
DIG NOT RINSE! PRESERVATIVE REQUIRED!

Sampling Address: _____

Sampling Point: MW-9A Sampled By: AEC
 Date: 4-27-94 Time: 1200 Grp Composite
 Parameters: CN BY EPA 335.2

SAMPLE LABEL

SAMPLE NO.		DATE	4-27-94	
SIGNATURE		A.B. Cedarion		
PRINT NAME & TITLE		A.B. CEDARIAN / FIELD TEAM LEADER		
		Seal broken	DATE	

CUSTODY SEAL

Attachment B
Sample Container, Preservation, and Holding Time Requirements

Soil Parameters	Analytical Method	Container	Preservative	Holding Time
BTEXs	SW-846 8021B	4 oz glass soil jar	Cool 4 degrees C	14 days
VOCs	SW-846 8260	4 oz glass soil jar	Cool 4 degrees C	14 days
PAHs	SW-846 8270C SIM	4 oz glass soil jar	Cool 4 degrees C	14 days
SVOCs	SW-846 8270C	4 oz glass soil jar	Cool 4 degrees C	14 days
Total Metals	SW-846 6010B	4 oz glass soil jar	Cool 4 degrees C	6 months
Cyanide	SW-846 9010	4 oz glass soil jar	Cool 4 degrees C	14 days
RCRA HWC	SW-846 7.3/1010/9045	4 oz glass soil jar	Cool 4 degrees C	NA

Water Parameters	Analytical Method	Container	Preservative	Holding Time
BTEXs	SW-846 8021B	3 40 mL Purge Vials	HCL, Cool 4 degrees C	14 days
VOCs	SW-846 8260B	3 40 mL Purge Vials	HCL, Cool 4 degrees C	14 days
PAHs	SW-846 8270C SIM	1 L Amber Glass	Cool 4 degrees C	7 days
SVOCs	SW-846 8270C	1 L Amber Glass	Cool 4 degrees C	7 days
Total Metals	SW-846 6010B	1 plastic pint	HNO ₃ , Cool 4 degrees C	6 months
Filtered Dissolved Metals	SW-846 6010B	1 plastic pint	HNO ₃ , Cool 4 degrees C	6 months
Unfiltered Dissolved Metals	SW-846 6010B	1 plastic pint	Cool 4 degrees C	14 days
Cyanide	SM 4500 CN EPA 335.3	1 plastic 250 mL	NaOH, Cool 4 degrees C	14 days
Methane	EPA 3810	3 40 mL Purge Vials	HCL, Cool 4 degrees C	14 days
Carbon Dioxide	SM4500-C02 D	1 plastic pint	Cool 4 degrees C	14 days
Alkalinity	EPA 310.1	1 plastic pint	Cool 4 degrees C	14 days
Ammonia	EPA 350.1	1 plastic pint	H ₂ SO ₄ , Cool 4 degrees C	28 days
TKN	EPA 351.2	1 plastic pint	H ₂ SO ₄ , Cool 4 degrees C	28 days
Nitrate + Nitrite	EPA 353.2	1 plastic pint	H ₂ SO ₄ , Cool 4 degrees C	28 days
Sulfate	EPA 300.0	1 plastic pint	Cool 4 degrees C	28 days
Sulfide	EPA 376.1	1 plastic pint	NaOH + Zinc Acetate, Cool 4 degrees C	7 days

QUALITY ASSURANCE PROJECT PLAN

Columbus Former Manufactured Gas Plant
Site
1169 22nd Avenue
Columbus, Nebraska 68601

Prepared for
Centel Corporation
For Submission
To EPA/NDEQ

January 2004

QUALITY ASSURANCE PROJECT PLAN

RSE INVESTIGATION

for the

COLUMBUS FORMER MANUFACTURED GAS PLANT SITE

COLUMBUS, NEBRASKA

Prepared For:


Centel Corporation

Prepared By:

BLACK & VEATCH CORPORATION

January 26, 2004

APPROVED BY:



Mark G. Snyder, Black & Veatch Project Manager

1/26/04

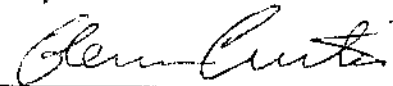
Date



Jeff Adkins, CM, Centel Corporation Project Manager

Jan 26 04

Date



Glenn Curtis, U.S. Environmental Protection Agency
Region VII Project Coordinator

3-11-04

Date

Robert Dona, U.S. Environmental Protection Agency
Region VII Quality Assurance Officer

Date

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Appendix

Attachment A Analytical Methods and Detection Limits

1.0 Introduction

This quality assurance project plan (QAPP) is to be used to perform environmental investigation and engineering services at the Columbus former manufactured gas plant (MGP) site, herein referred to as the "Site". The QAPP will be used in conjunction with a site-specific field investigation work plan and field sampling plan (FSP) to establish consistent field and laboratory procedures and methods during environmental monitoring and measurement efforts.

A comprehensive QAPP is needed to obtain data that are scientifically and legally defensible and to achieve the levels of precision and accuracy specified by the data quality goals with a minimal expenditure of resources. This QAPP describes the project organization, quality assurance objectives, field investigation procedures, documentation procedures, and quality assurance/quality control (QA/QC) activities designed to achieve the data quality goals of environmental monitoring and measurement efforts. This plan is based on U.S. Environmental Protection Agency (EPA) guidelines specified in *Requirements for Quality Assurance Project Plans*, EPA, QA/R-5, March 2001.

Background information for the site is provided in the site-specific work plan.

2.0 Project Organization and Responsibilities

Black & Veatch has the primary responsibility for the Removal Site Evaluation (RSE) investigation. The Black & Veatch team includes the following:

- Principal-In-Charge -- Steve Phillips
- Project Manager -- Mark Snyder
- Project Engineer -- Cary Hirner
- Field Team Leader -- To be determined
- Health & Safety Manager -- Jack Schill, CIH, CSP
- Quality Assurance Manager -- Girma Mergia, P.E.

The responsibility for successful performance rests primarily with the Black & Veatch project manager. The project manager has the ultimate responsibility for ensuring that all project deliverables meet the QA objectives established for the work, including providing technical direction and managing daily activities of subcontractors and Black & Veatch staff members assigned to the project. The project engineer and field team, which will include a geological engineer or geologist, will be responsible for maintaining the quality of work in the field and following the QA procedures described in this document and in the FSP. The Health and Safety Manager reviews and approves the Site safety and health plan and ensures that proper safety procedures are followed.

Black & Veatch's work will be responsive to Centel Corporation. Key members of this organization include:

- Jeff Adkins, CIH, Manager of Environmental Health

3.0 Quality Assurance Objectives

The principal objective of the QAPP is to maintain and document the quality of data generated for the Site. More specifically, the objective is to develop and implement QA procedures for laboratory and field activities and QA reporting procedures that will produce legally and scientifically defensible results. These procedures are described in this QAPP. The purpose of this section is to define measurement objectives, detection limits, and QC parameters.

3.1 Measurement Objectives

Measurement parameters depend upon the circumstances surrounding the measurement effort, the type and concentration of media to be sampled, and measurements to be taken. Measurements will be taken to yield results that are representative of the media and conditions. To allow comparison of databases, analytical data will be reported in units consistent with those used by other agencies and organizations to report previous analytical data. To ensure that sample analyses and laboratory QA/QC procedures are consistent with Nebraska Department of Environmental Quality and EPA requirements, an EPA Contract Laboratory Program-approved or equivalent laboratory will be used.

The objectives of this investigation are to define the presence, nature, and extent of source material and soil contamination, and to gather sufficient information about the source material and Site to select appropriate, cost effective removal or remedial actions, if necessary. In addition, groundwater samples will be collected from proposed and existing monitoring wells to develop baseline conditions prior to the groundwater removal action planned by EPA at the unrelated 10th Street Superfund Site. The analytical methods that are being used to detect chemicals of concern for this investigation are listed in Tables 3-1A and 3-1B. The objectives for the analyses being conducted are summarized in the FSP.

TABLE 3-1A
LABORATORY SOIL ANALYTICAL METHODS
Quality Assurance Project Plan
Columbus MGP Site

Sample Type	Analyte	Method
Soil	BTEXs	SW-846 Method 8021B
	PAHs	SW-846 Method 8270C SIM
	Phenols ⁽¹⁾	SW-846 Method 8270C
	RCRA Metals (selected) ⁽²⁾	SW-846 Methods 6010B
	Total Cyanide	SW-846 Method 9010
Source Material	RCRA Characteristics [corrosivity, ignitability, and reactivity (sulfur and cyanide)]	SW-846 Methods 9045, 1010, 7.3
	BTEXs	SW-846 Method 8021B
	PAHs	SW-846 Method 8270C SIM
	Phenols ⁽¹⁾	SW-846 Method 8270C
	RCRA Metals (selected) ⁽²⁾	SW-846 Methods 6010B
	Total Cyanide	SW-846 Method 9010
Soil Cuttings (containerized)	VOCs	SW-846 Method 8260B
	SVOCs	SW-846 Method 8270C
	RCRA Metals (selected) ⁽²⁾	SW-846 Methods 6010B
	Total Cyanide	SW-846 Method 9010

Abbreviations:

BTEXs	benzene, toluene, ethylbenzene, and total xylenes
PAHs	polynuclear aromatic hydrocarbons
VOCs	volatile organic compounds
SVOCs	semivolatile organic compounds
RCRA	Resource Conservation Recovery Act

Notes:

⁽¹⁾ Only soil/source material samples collected from soil probes SP-11, SP-12, and SP-13 will be analyzed for phenols.

⁽²⁾ The RCRA metals to be analyzed include arsenic, barium, cadmium, chromium, and lead.

TABLE 3-1B
LABORATORY GROUNDWATER ANALYTICAL METHODS
Quality Assurance Project Plan
Columbus MGP Site

Sample Type	Analyte	Method
Groundwater	PAHs	SW-846 Method 8270C SIM
	BTEXs	SW-846 Method 8021B
	RCRA Metals (selected) ⁽¹⁾	SW-846 Methods 6010B
	Cyanide	EPA 335.3/SM 4500 CN
	Methane	SW-846 Method 3810
	Carbon Dioxide	SM 4500-CO2D
	Alkalinity	EPA 310.1
	Ammonia	EPA 350.1
	Total Kjeldahl Nitrogen (TKN)	EPA 351.2
	Nitrate/Nitrite Nitrogen	EPA 353.2
	Sulfate	EPA 300.0
	Sulfide	EPA 376.1
	Total & Dissolved Iron	SW-846 Method 6010B
	Total & Dissolved Manganese	SW-846 Method 6010B
	Total Phenols	SW-846 Method 8270C
Potable Water and Rinsate Blank (non-dedicated bladder pump only)	PAHs	SW-846 Method 8280C SIM
	BTEXs	SW-846 Method 8021B
	RCRA Metals (selected) ⁽¹⁾	SW-846 Methods 6010B
Trip and Field Blanks	BTEXs	SW-846 Method 8021B
Decontamination/Purge Water (containerized)	VOCs	SW-846 Method 8260B
	SVOCs	SW-846 Method 8270C
	Total Cyanide	EPA Method 335.3
	RCRA Metals (selected) ⁽¹⁾	SW-846 Methods 6010B
Abbreviations:		
BTEXs benzene, toluene, ethylbenzene, and total xylenes		
PAHs polynuclear aromatic hydrocarbons		
VOCs volatile organic compounds		
SVOCs semi-volatile organic compounds		
RCRA Resource Conservation and Recovery Act		
Notes:		
⁽¹⁾ RCRA metals to be analyzed include arsenic, barium, cadmium, chromium, and lead.		

3.2 Detection Limits

The method detection limit (MDL) is the limit of detection specific to a selected method of analysis and analyte of interest and is dependent on the efficiency of the methodology and analytical instrumentation. MDLs are determined statistically from a series of replicate analyses and are established before routine sample analysis by the laboratory.

As described in SW-846, detection of individual analytes is defined by the practical quantitation limit (PQL) that measures the lowest level that can be reliably quantified within specific limits of precision and accuracy using the specified method protocols. However, depending on instrument modification and methodology variance, lower limits may be established to quantify method analytes. Generally, analyte presence will be confirmed by and referenced to the method PQL.

The quantitation limits for the analytical methods to be used are included in Attachment A to this QAPP.

3.3 QC Parameters

The objective of quality assurance is to ensure that environmental monitoring data collected are of known and acceptable quality. To meet this objective, the following QC parameters are considered: precision and accuracy, representativeness, comparability, and completeness. The data are evaluated for meeting these parameters during analyses by the laboratory and during the data validation process.

3.3.1 Precision and Accuracy

The precision and accuracy QC parameters measure the reproducibility of analytical results and the bias of a measurement method. QC limits for the precision and accuracy have been established under EPA SW-846 method-specific requirements.

Precision of analytical results can be measured by comparing the results of primary samples and duplicate samples. The variation in the results is a measure of precision. Variation attributable to analysis is detected by observing the discrepancies between the primary and duplicate samples. Precision can be determined by the relative percent difference, which is expressed as follows:

$$RPD = \frac{|D_1 - D_2|}{\frac{(D_1 + D_2)}{2}} \times 100$$

where

RPD = relative percent difference,
D₁ = primary sample value, and
D₂ = duplicate sample value.

Accuracy of chemical test results is assessed by examining average spike recovery results. Spike recovery is determined by dividing a series of samples into two portions, spiking one of the portions (adding a known quantity of the constituent of interest), and submitting both portions for laboratory analysis as independent samples. Spike recovery is then calculated as follows:

$$\text{Spike Recovery} = \frac{\text{SSR} - \text{SR}}{\text{SA}} \times 100$$

where

SSR = spike sample results,
SR = unspiked sample results, and
SA = spike added from spiking mix.

Average spike recovery can be calculated by taking the average of the individual recoveries for a given compound. Two types of recoveries are measured, matrix spike recoveries and surrogate spike recoveries. For a matrix spike, known amounts of standard compounds identical to the compounds present in the sample of interest are added to the sample. For a surrogate spike, the standards are chemically similar, but not identical to the compounds in the fraction being analyzed. The purpose of the surrogate spike is to provide QC on every sample by monitoring for unusual matrix effects and gross sample processing errors in analysis of organic compounds.

The control limits for precision and accuracy established under SW-846 guidelines will be used to identify outliers (data results outside the specified control limits). If outliers occur, the samples in question will be reanalyzed, if possible, or carefully evaluated on a case-by-case basis.

3.3.2 Representativeness

Representativeness expresses the degree to which sampling data accurately and precisely represent conditions at the Site. The determination of the representativeness of the data will be performed by the following methods.

- Comparing actual sampling procedures with those delineated in the work plan and the QAPP.
- Comparing analytical results of field duplicates to determine the spread in the analytical results.
- Examining the results of QC blanks for evidence of contamination; contamination may be cause for invalidation or qualification of the affected samples.

Results classified as questionable or qualitative by any of these criteria will be documented and possibly invalidated.

3.3.3 Comparability

Comparability expresses the confidence with which one set of analytical data may be compared with another. Data sets that can be used for comparison are hazard criteria and data from previous studies. Comparability is maintained by being aware of previous analytical work and by using standard analytical methods and units. Comparability will be achieved through the use of this QAPP, which will guide this and subsequent studies.

3.3.4 Completeness

Completeness is the percentage of measurements made which are judged to be valid measurements. It can be expressed as a percentage of site-specific data that meets QA/QC requirements and passes the data validation process without significant problems or qualifiers, as follows:

$$\frac{\text{Valid Data}}{\text{Total Projected Data}} \times 100 = \text{Percent Completeness}$$

Completeness will be assessed using this equation. The site completeness goal for this site is 85 percent or higher. If the data fail to meet the completeness objective, the need for resampling will be evaluated.

4.0 Quality Assurance Procedures for Laboratory and Field Activities

Several quality assurance procedures will be employed before, during, and after collection and analysis of samples. The following QAPP elements are addressed separately for laboratory and field activities:

- Sample custody.
- Analytical procedures, calibration procedures, and sampling frequency.
- Data validation, reduction, and assessment.
- Internal quality control.
- Performance and systems audits.
- Preventive maintenance.
- Procedures to assess precision, accuracy, and completeness.
- Corrective action.

4.1 Laboratory Activities

The laboratory selected to perform the analyses will follow EPA method-specific protocols for the methods listed in Section 3.1.

4.1.1 Sample Custody

Laboratory custody will conform to procedures established in the laboratory QAPP. The laboratory's QAPP will be reviewed by Black & Veatch to identify standard QA/QC protocols to be followed.

4.1.2 Analytical Procedures, Calibration Procedures, and Frequency

EPA SW-846 and other EPA analyses will follow method-specific QA/QC requirements.

4.1.3 Data Validation, Reduction, and Assessment

Data validation will be performed by Black & Veatch personnel or by Validata Chemical Services, Inc., under subcontract to Black & Veatch. The raw data collected and used in project reports will be appropriately identified and included in the RSE Report.

Data reduction includes all processes that change either the form of expression, quantity of data values, or number of data items. The Black & Veatch project team will analyze the validated data and perform the data reduction for inclusion of these data in the RSE Report. Methods used for data reduction will be described in the report.

Black & Veatch personnel will evaluate the data to ensure that specified QA objectives are met.

4.1.4 Internal Quality Control

Internal quality control procedures for EPA SW-846 and other EPA analyses will follow method-specific QA/QC requirements.

4.1.5 Performance and System Audits

The laboratory will provide information on performance and system audits in which it has participated. The laboratory must meet stringent requirements and standards for equipment, personnel, laboratory practices, analytical operations, and QC. Black & Veatch will receive data packages, including associated QA/QC documentation. These data will be reviewed as part of the data validation process.

4.1.6 Preventive Maintenance

The laboratory is responsible for maintaining the equipment used during analytical procedures. Specific instrument calibration and tuning requirements ensure that the results obtained are reliable. It is the laboratory's responsibility to ensure that backup systems and equipment are available as required.

4.1.7 Procedures to Assess Precision and Accuracy

Definitions of accuracy and precision are listed in the method descriptions for specified analyses. Accuracy and precision will be assessed by examining analytical data for field duplicates and audit samples. This will be done by the Black & Veatch project team. During data assessment, instrument sensitivity will be checked by reviewing the laboratory

reports. Accuracy and precision data from analyses will be compared with the established QC limits to identify data outliers.

4.1.8 Corrective Action

If QC audits or data review result in detection of unacceptable data, corrective action will be taken in accordance with the requirements outlined in the laboratory's QAPP. Corrective action may include resampling and analyzing, evaluating, and amending sampling and analytical procedures, or accepting data and acknowledging the level of uncertainty.

4.2 Field Activities

4.2.1 Sample Custody

Because of the critical need to ensure QA procedures are followed when samples are in the custody of the field personnel, standardized sample documentation has been established. Sample custody is discussed in detail in the FSP.

4.2.2 Analytical Procedures, Calibration Procedures, and Frequency

Specific procedures for field measurements are given in the FSP. Analytical and calibration procedures for field measurement equipment will be as specified in the manufacturer's instructions for each equipment item. These instructions will be made available to team members before the start of field activities. Equipment and instruments to be used in the field for personnel safety will be addressed in the Site health and safety plan.

4.2.3 Data Validation, Reduction, and Assessment

Field logbooks, sample documentation, calculation worksheets, and similar documentation used in the investigation will be retained and will become a part of the final project file. Raw data will be summarized in the RSE Report. The Black & Veatch project team will assess the data to ensure that QA objectives are met.

4.2.4 Internal Quality Control

Blank and duplicate samples are included (when appropriate) with the samples sent for laboratory analyses to monitor QC of field sampling and laboratory analysis procedures. The QC samples to be collected are described in the work plan and FSP.

Samples for temperature, specific conductance, pH, turbidity, dissolved oxygen, and oxidation-reduction potential are not retained. The primary QA objective for these data is to obtain reproducible measurements to a degree of accuracy consistent with limits imposed by the equipment. Reproducibility of measurements will be checked by properly calibrating instruments and by taking multiple readings.

4.2.5 Performance and System Audits

As part of a performance and system audit of field activities, members of Black & Veatch senior review team may conduct a site visit. The purpose of the site visit is to review and evaluate the sample classification, sampling, and field measurement procedures, chain-of-custody procedures, and field documentation. Following the site visit, the review team will issue a report summarizing the results of the evaluation and recommending for corrective actions, if needed.

4.2.6 Preventive Maintenance

Preventive maintenance of equipment is essential if project resources are to be used in a cost-effective manner. Preventive maintenance takes two forms: regularly scheduled preventive maintenance activities to minimize downtime and to ensure accuracy of measurement systems, and availability of critical spare parts, backup systems, and equipment. Any equipment or device determined by field personnel or by the site safety coordinator not to be in safe working order will be replaced, repaired, or corrected at the most efficient expenditure of resources.

Subcontract agreements with firms providing services will specify that equipment used at the site will be maintained in safe working order. Any equipment or device determined by field personnel or by the site safety coordinator not to be in safe working order will be replaced, repaired, or corrected at the subcontractor's expense.

4.2.7 Procedures to Assess Precision and Accuracy

Quantitative levels for precision and accuracy are not specified for field measurements. However, proper maintenance, calibration, and operating procedures (according to instrument manufacturer's recommendations) will be followed, so reliable results will be obtained. Instruments will be calibrated at recommended intervals to ensure measurement accuracy, and multiple measurements will be taken to ensure precision of field measurements.

4.2.8 Corrective Action

If QC audits result in detection of unacceptable data, the project manager will ultimately be responsible for developing and initiating corrective action. For field measurements, this may include one or more of the following:

- Repeating the measurement to check the error.
- Checking ambient condition controls (e.g., temperature).
- Checking the power supply to the instrument, if any.
- Checking the instrument calibration.
- Replacing or repairing the instrument or measuring device.

Corrective actions for sampling procedures may include:

- Evaluating and amending sampling procedures.
- Resampling.

The corrective action form on the following page will be completed if corrective action needs to be taken during the investigation.

CORRECTIVE ACTION FORM

Sample Program Identification: _____

Sampling Dates: _____

Material to be Sampled: _____

Measurement Parameter: _____

Acceptable Data Range: _____

Corrective Action Initiated By: _____

Title: _____ Date: _____

Problem Areas Requiring Corrective Action: _____

Measures to Correct Problems: _____

Means of Detecting Problems (field observations, systems audit, etc.): _____

Approval for Corrective Action: _____

Title: _____ Date: _____

Signature: _____

5.0 Quality Assurance Reports

Separate quality assurance reports are not expected. The RSE Report will summarize quality information for the data collected during the project.

Attachment A
Analytical Methods and Detection Limits

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 8021B	Solid	Benzene	13	50	ug/kg
EPA 8021B	Solid	Ethylbenzene	16	50	ug/kg
EPA 8021B	Solid	Methyl-tert-butyl ether	57	250	ug/kg
EPA 8021B	Solid	Naphthalene	16	250	ug/kg
EPA 8021B	Solid	Toluene	33	50	ug/kg
EPA 8021B	Solid	Xylene (Total)	53	175	ug/kg
EPA 8021B	Water	Benzene	0.21	2.0	ug/L
EPA 8021B	Water	Ethylbenzene	0.19	2.0	ug/L
EPA 8021B	Water	Methyl-tert-butyl ether	1.30	10.0	ug/L
EPA 8021B	Water	Naphthalene	0.62	10.0	ug/L
EPA 8021B	Water	Toluene	0.25	2.0	ug/L
EPA 8021B	Water	Xylene (Total)	0.83	7.0	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 8310	Solid	Acenaphthene	4.5	16.7	ug/kg
EPA 8310	Solid	Acenaphthylene	8.9	33.3	ug/kg
EPA 8310	Solid	Anthracene	0.8	3.4	ug/kg
EPA 8310	Solid	Benzo(k)fluoranthene	0.8	3.4	ug/kg
EPA 8310	Solid	Benzo(g,h,i)perylene	3	10	ug/kg
EPA 8310	Solid	Benzo(a)anthracene	1.2	5	ug/kg
EPA 8310	Solid	Benzo(b)fluoranthene	0.9	3.3	ug/kg
EPA 8310	Solid	Benzo(a)pyrene	1.6	5	ug/kg
EPA 8310	Solid	Chrysene	0.9	3.4	ug/kg
EPA 8310	Solid	Dibenz(a,h)anthracene	2.6	10	ug/kg
EPA 8310	Solid	Fluorene	4.2	15	ug/kg
EPA 8310	Solid	Fluoranthene	2.1	10	ug/kg
EPA 8310	Solid	Indeno(1,2,3-cd)pyrene	1.1	3.4	ug/kg
EPA 8310	Solid	Naphthalene	13.1	50	ug/kg
EPA 8310	Solid	Phenanthrene	1.4	5	ug/kg
EPA 8310	Solid	Pyrene	1.1	5	ug/kg
EPA 8310	Water	Acenaphthene	0.114	0.5	ug/L
EPA 8310	Water	Acenaphthylene	0.098	1	ug/L
EPA 8310	Water	Anthracene	0.009	0.05	ug/L
EPA 8310	Water	Benzo(k)fluoranthene	0.013	0.1	ug/L
EPA 8310	Water	Benzo(g,h,i)perylene	0.023	0.1	ug/L
EPA 8310	Water	Benzo(a)anthracene	0.015	0.1	ug/L
EPA 8310	Water	Benzo(b)fluoranthene	0.024	0.1	ug/L
EPA 8310	Water	Benzo(a)pyrene	0.015	0.1	ug/L
EPA 8310	Water	Chrysene	0.014	0.1	ug/L
EPA 8310	Water	Dibenz(a,h)anthracene	0.035	0.1	ug/L
EPA 8310	Water	Fluorene	0.020	0.1	ug/L
EPA 8310	Water	Fluoranthene	0.039	0.1	ug/L
EPA 8310	Water	Indeno(1,2,3-cd)pyrene	0.021	0.1	ug/L
EPA 8310	Water	Naphthalene	0.094	0.5	ug/L
EPA 8310	Water	Phenanthrene	0.019	0.1	ug/L
EPA 8310	Water	Pyrene	0.026	0.1	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 3520C/8270C SIM	Water	Acenaphthylene	0.03	0.1	ug/L
EPA 3520C/8270C SIM	Water	Acenaphthene	0.03	0.1	ug/L
EPA 3520C/8270C SIM	Water	Anthracene	0.03	0.1	ug/L
EPA 3520C/8270C SIM	Water	Benzo(k)fluoranthene	0.04	0.1	ug/L
EPA 3520C/8270C SIM	Water	Benzo(g,h,i)perylene	0.06	0.1	ug/L
EPA 3520C/8270C SIM	Water	Benzo(a)anthracene	0.02	0.1	ug/L
EPA 3520C/8270C SIM	Water	Benzo(b)fluoranthene	0.05	0.1	ug/L
EPA 3520C/8270C SIM	Water	Benzo(a)pyrene	0.05	0.1	ug/L
EPA 3520C/8270C SIM	Water	Chrysene	0.05	0.1	ug/L
EPA 3520C/8270C SIM	Water	Dibenz(a,h)anthracene	0.06	0.1	ug/L
EPA 3520C/8270C SIM	Water	Fluorene	0.05	0.1	ug/L
EPA 3520C/8270C SIM	Water	Fluoranthene	0.04	0.1	ug/L
EPA 3520C/8270C SIM	Water	Indeno(1,2,3-cd)pyrene	0.06	0.1	ug/L
EPA 3520C/8270C SIM	Water	Naphthalene	0.03	0.1	ug/L
EPA 3520C/8270C SIM	Water	Phenanthrene	0.03	0.1	ug/L
EPA 3520C/8270C SIM	Water	Pyrene	0.03	0.1	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 3550B/8270C SIM	Solid	Acenaphthylene	1.7	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Acenaphthene	1.6	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Anthracene	2.0	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Benzo(k)fluoranthene	2.5	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Benzo(g,h,i)perylene	2.2	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Benzo(a)anthracene	1.9	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Benzo(b)fluoranthene	2.7	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Benzo(a)pyrene	1.9	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Chrysene	1.7	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Dibenz(a,h)anthracene	2.4	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Fluorene	1.8	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Fluoranthene	2.2	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Indeno(1,2,3-cd)pyrene	2.4	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Naphthalene	1.7	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Phenanthrene	2.4	3.3	ug/kg
EPA 3550B/8270C SIM	Solid	Pyrene	2.1	3.3	ug/kg

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 3550B/8270C	Solid	1,2,4-Trichlorobenzene	33	330	ug/kg
EPA 3550B/8270C	Solid	1,2-Dichlorobenzene	34	330	ug/kg
EPA 3550B/8270C	Solid	1,3-Dichlorobenzene	29	330	ug/kg
EPA 3550B/8270C	Solid	1,4-Dichlorobenzene	29	330	ug/kg
EPA 3550B/8270C	Solid	2,4,5-Trichlorophenol	60	330	ug/kg
EPA 3550B/8270C	Solid	2,4,6-Trichlorophenol	47	330	ug/kg
EPA 3550B/8270C	Solid	2,4-Dichlorophenol	46	330	ug/kg
EPA 3550B/8270C	Solid	2,4-Dimethylphenol	53	330	ug/kg
EPA 3550B/8270C	Solid	2,4-Dinitrotoluene	44	330	ug/kg
EPA 3550B/8270C	Solid	2,6-Dinitrotoluene	48	330	ug/kg
EPA 3550B/8270C	Solid	2,4-Dinitrophenol	65	1600	ug/kg
EPA 3550B/8270C	Solid	2-Chloronaphthalene	40	330	ug/kg
EPA 3550B/8270C	Solid	2-Chlorophenol	42	330	ug/kg
EPA 3550B/8270C	Solid	2-Methylnaphthalene	32	330	ug/kg
EPA 3550B/8270C	Solid	2-Methylphenol (o-Cresol)	55	330	ug/kg
EPA 3550B/8270C	Solid	2-Nitroaniline	50	1600	ug/kg
EPA 3550B/8270C	Solid	2-Nitrophenol	44	330	ug/kg
EPA 3550B/8270C	Solid	3,3'-Dichlorocenzidine	107	660	ug/kg
EPA 3550B/8270C	Solid	3-Nitroaniline	69	1600	ug/kg
EPA 3550B/8270C	Solid	4,6-Dinitro-2-methylphenol	74	1600	ug/kg
EPA 3550B/8270C	Solid	4-Bromophenylphenyl ether	43	330	ug/kg
EPA 3550B/8270C	Solid	4-Chloro-3-methylphenol	55	660	ug/kg
EPA 3550B/8270C	Solid	4-Chloroaniline	88	660	ug/kg
EPA 3550B/8270C	Solid	4-Chlorophenylphenyl ether	45	330	ug/kg
EPA 3550B/8270C	Solid	4-Methylphenol (p-Cresol)	55	330	ug/kg
EPA 3550B/8270C	Solid	4-Nitroaniline	46	1600	ug/kg
EPA 3550B/8270C	Solid	4-Nitrophenol	56	1600	ug/kg
EPA 3550B/8270C	Solid	Acenaphthene	40	330	ug/kg
EPA 3550B/8270C	Solid	Acenaphthylene	39	330	ug/kg
EPA 3550B/8270C	Solid	Anthracene	54	330	ug/kg
EPA 3550B/8270C	Solid	Benzo(a)anthracene	52	330	ug/kg
EPA 3550B/8270C	Solid	Benzo(a)pyrene	53	330	ug/kg
EPA 3550B/8270C	Solid	Benzo(b)fluoranthene	92	330	ug/kg
EPA 3550B/8270C	Solid	Benzo(g,h,i)perylene	60	330	ug/kg
EPA 3550B/8270C	Solid	Benzo(k)fluoranthene	110	330	ug/kg
EPA 3550B/8270C	Solid	Benzoic acid	102	1600	ug/kg
EPA 3550B/8270C	Solid	Benzyl alcohol	81	660	ug/kg
EPA 3550B/8270C	Solid	bis(2-Chloroethoxy)methane	38	330	ug/kg
EPA 3550B/8270C	Solid	bis(2-Chloroethyl) ether	46	330	ug/kg
EPA 3550B/8270C	Solid	bis(2-Chloroisopropyl) ether	28	330	ug/kg
EPA 3550B/8270C	Solid	bis(2-Ethylhexyl)phthalate	58	330	ug/kg
EPA 3550B/8270C	Solid	Butylbenzylphthalate	49	330	ug/kg
EPA 3550B/8270C	Solid	Carbazole	43	330	ug/kg
EPA 3550B/8270C	Solid	Chrysene	50	330	ug/kg
EPA 3550B/8270C	Solid	Dibenz(a,h)anthracene	54	330	ug/kg
EPA 3550B/8270C	Solid	Dibenzofuran	38	330	ug/kg
EPA 3550B/8270C	Solid	Diethylphthalate	42	330	ug/kg
EPA 3550B/8270C	Solid	Dimethylphthalate	48	330	ug/kg

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 3550B/8270C	Solid	Di-n-butylphthalate	49	330	ug/kg
EPA 3550B/8270C	Solid	Di-n-octylphthalate	42	330	ug/kg
EPA 3550B/8270C	Solid	Fluoranthene	54	330	ug/kg
EPA 3550B/8270C	Solid	Fluorene	39	330	ug/kg
EPA 3550B/8270C	Solid	Hexachloro-1,3-butadiene	28	330	ug/kg
EPA 3550B/8270C	Solid	Hexachlorobenzene	38	330	ug/kg
EPA 3550B/8270C	Solid	Hexachlorocyclopentadiene	29	330	ug/kg
EPA 3550B/8270C	Solid	Hexachloroethane	43	330	ug/kg
EPA 3550B/8270C	Solid	Indeno(1,2,3-cd)pyrene	48	330	ug/kg
EPA 3550B/8270C	Solid	Isophorone	40	330	ug/kg
EPA 3550B/8270C	Solid	Naphthalene	37	330	ug/kg
EPA 3550B/8270C	Solid	Nitrobenzene	30	330	ug/kg
EPA 3550B/8270C	Solid	N-Nitroso-di-n-propylamine	44	330	ug/kg
EPA 3550B/8270C	Solid	N-Nitrosodiphenylamine	57	330	ug/kg
EPA 3550B/8270C	Solid	Pentachlorophenol	57	1600	ug/kg
EPA 3550B/8270C	Solid	Phenanthrene	46	330	ug/kg
EPA 3550B/8270C	Solid	Phenol	45	330	ug/kg
EPA 3550B/8270C	Solid	Pyrene	46	330	ug/kg

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 3510C/8270C	Water	1,2,4-Trichlorobenzene	1.9	10	ug/L
EPA 3510C/8270C	Water	1,2-Dichlorobenzene	1.8	10	ug/L
EPA 3510C/8270C	Water	1,3-Dichlorobenzene	2.1	10	ug/L
EPA 3510C/8270C	Water	1,4-Dichlorobenzene	2.0	10	ug/L
EPA 3510C/8270C	Water	2,4,5-Trichlorophenol	2.0	50	ug/L
EPA 3510C/8270C	Water	2,4,6-Trichlorophenol	1.8	10	ug/L
EPA 3510C/8270C	Water	2,4-Dichlorophenol	1.9	10	ug/L
EPA 3510C/8270C	Water	2,4-Dimethylphenol	4.5	10	ug/L
EPA 3510C/8270C	Water	2,4-Dinitrophenol	1.2	50	ug/L
EPA 3510C/8270C	Water	2,4-Dinitrotoluene	1.7	10	ug/L
EPA 3510C/8270C	Water	2,6-Dinitrotoluene	1.9	10	ug/L
EPA 3510C/8270C	Water	2-Chloronaphthalene	1.7	10	ug/L
EPA 3510C/8270C	Water	2-Chlorophenol	1.9	10	ug/L
EPA 3510C/8270C	Water	2-Methylnaphthalene	2.0	10	ug/L
EPA 3510C/8270C	Water	2-Methylphenol (o-Cresol)	1.7	10	ug/L
EPA 3510C/8270C	Water	2-Nitroaniline	1.3	50	ug/L
EPA 3510C/8270C	Water	2-Nitrophenol	2.1	10	ug/L
EPA 3510C/8270C	Water	3,3'-Dichlorobenzidine	1.5	20	ug/L
EPA 3510C/8270C	Water	3-Nitroaniline	1.3	50	ug/L
EPA 3510C/8270C	Water	4,6-Dinitro-2-methylphenol	2.0	50	ug/L
EPA 3510C/8270C	Water	4-Bromophenylphenyl ether	1.5	10	ug/L
EPA 3510C/8270C	Water	4-Chloro-3-methylphenol	1.6	20	ug/L
EPA 3510C/8270C	Water	4-Chloroaniline	1.5	20	ug/L
EPA 3510C/8270C	Water	4-Chlorophenylphenyl ether	1.6	10	ug/L
EPA 3510C/8270C	Water	4-Methylphenol (p-Cresol)	1.7	10	ug/L
EPA 3510C/8270C	Water	4-Nitroaniline	1.9	50	ug/L
EPA 3510C/8270C	Water	4-Nitrophenol	1.1	50	ug/L
EPA 3510C/8270C	Water	Acenaphthene	1.9	10	ug/L
EPA 3510C/8270C	Water	Acenaphthylene	1.4	10	ug/L
EPA 3510C/8270C	Water	Anthracene	1.4	10	ug/L
EPA 3510C/8270C	Water	Benzo(d)anthracene	1.5	10	ug/L
EPA 3510C/8270C	Water	Benzo(a)pyrene	1.5	10	ug/L
EPA 3510C/8270C	Water	Benzo(b)fluoranthene	2.4	10	ug/L
EPA 3510C/8270C	Water	Benzo(g,h,i)perylene	1.5	10	ug/L
EPA 3510C/8270C	Water	Benzo(k)fluoranthene	3.4	10	ug/L
EPA 3510C/8270C	Water	Benzoic acid	2.3	50	ug/L
EPA 3510C/8270C	Water	Benzyl alcohol	2.1	20	ug/L
EPA 3510C/8270C	Water	bis(2-Chloroethoxy)methane	2.1	10	ug/L
EPA 3510C/8270C	Water	bis(2-Chloroethyl) ether	1.9	10	ug/L
EPA 3510C/8270C	Water	bis(2-Chloroisopropyl) ether	2.3	10	ug/L
EPA 3510C/8270C	Water	bis(2-Ethylhexyl)phthalate	1.4	10	ug/L
EPA 3510C/8270C	Water	Butylbenzylphthalate	1.2	10	ug/L
EPA 3510C/8270C	Water	Carbazole	1.5	10	ug/L
EPA 3510C/8270C	Water	Chrysene	1.2	10	ug/L
EPA 3510C/8270C	Water	Dibenz(a,h)anthracene	1.6	10	ug/L
EPA 3510C/8270C	Water	Dibenzofuran	1.6	10	ug/L
EPA 3510C/8270C	Water	Diethylphthalate	1.2	10	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 3510C/8270C	Water	Dimethylphthalate	1.2	10	ug/L
EPA 3510C/8270C	Water	Di-n-butylphthalate	1.7	10	ug/L
EPA 3510C/8270C	Water	Di-n-octylphthalate	1.5	10	ug/L
EPA 3510C/8270C	Water	Fluoranthene	1.5	10	ug/L
EPA 3510C/8270C	Water	Fluorene	1.8	10	ug/L
EPA 3510C/8270C	Water	Hexachloro-1,3-butadiene	2.1	10	ug/L
EPA 3510C/8270C	Water	Hexachlorobenzene	1.1	10	ug/L
EPA 3510C/8270C	Water	Hexachlorocyclopentadiene	0.2	10	ug/L
EPA 3510C/8270C	Water	Hexachloroethane	2.0	10	ug/L
EPA 3510C/8270C	Water	Indeno(1,2,3-cd)pyrene	1.5	10	ug/L
EPA 3510C/8270C	Water	Isophorone	2.0	10	ug/L
EPA 3510C/8270C	Water	Naphthalene	2.4	10	ug/L
EPA 3510C/8270C	Water	Nitrobenzene	2.2	10	ug/L
EPA 3510C/8270C	Water	N-Nitroso-di-n-propylamine	2.0	10	ug/L
EPA 3510C/8270C	Water	N-Nitrosodiphenylamine	1.6	10	ug/L
EPA 3510C/8270C	Water	Pentachlorophenol	1.6	50	ug/L
EPA 3510C/8270C	Water	Phenanthrene	1.4	10	ug/L
EPA 3510C/8270C	Water	Phenol	0.5	10	ug/L
EPA 3510C/8270C	Water	Pyrene	1.6	10	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 3520C/8270C	Water	1,2,4-Trichlorobenzene	3.5	10	ug/L
EPA 3520C/8270C	Water	1,2-Dichlorobenzene	3.6	10	ug/L
EPA 3520C/8270C	Water	1,3-Dichlorobenzene	3.6	10	ug/L
EPA 3520C/8270C	Water	1,4-Dichlorobenzene	3.7	10	ug/L
EPA 3520C/8270C	Water	2,4,5-Trichlorophenol	3	50	ug/L
EPA 3520C/8270C	Water	2,4,6-Trichlorophenol	3.6	10	ug/L
EPA 3520C/8270C	Water	2,4-Dichlorophenol	4.3	10	ug/L
EPA 3520C/8270C	Water	2,4-Dimethylphenol	5	10	ug/L
EPA 3520C/8270C	Water	2,4-Dinitrophenol	1.8	50	ug/L
EPA 3520C/8270C	Water	2,4-Dinitrotoluene	3.4	10	ug/L
EPA 3520C/8270C	Water	2,6-Dinitrotoluene	3.3	10	ug/L
EPA 3520C/8270C	Water	2,4-Dinitrophenol	1.8	50	ug/L
EPA 3520C/8270C	Water	2-Chloronaphthalene	3.9	10	ug/L
EPA 3520C/8270C	Water	2-Chlorophenol	3.9	10	ug/L
EPA 3520C/8270C	Water	2-Methylnaphthalene	4	10	ug/L
EPA 3520C/8270C	Water	2-Methylphenol (o-Cresol)	3.9	10	ug/L
EPA 3520C/8270C	Water	2-Nitroaniline	3	50	ug/L
EPA 3520C/8270C	Water	2-Nitrophenol	4	10	ug/L
EPA 3520C/8270C	Water	3,3'-Dichlorobenzidine	6.1	20	ug/L
EPA 3520C/8270C	Water	3-Nitroaniline	3	50	ug/L
EPA 3520C/8270C	Water	4,6-Dinitro-2-methylphenol	2.7	50	ug/L
EPA 3520C/8270C	Water	4-Bromophenylphenyl ether	3.7	10	ug/L
EPA 3520C/8270C	Water	4-Chloro-3-methylphenol	4.3	20	ug/L
EPA 3520C/8270C	Water	4-Chloroaniline	2.6	20	ug/L
EPA 3520C/8270C	Water	4-Chlorophenylphenyl ether	3.8	10	ug/L
EPA 3520C/8270C	Water	4-Methylphenol (p-Cresol)	4	10	ug/L
EPA 3520C/8270C	Water	4-Nitroaniline	2.4	50	ug/L
EPA 3520C/8270C	Water	4-Nitrophenol	3.1	50	ug/L
EPA 3520C/8270C	Water	Acenaphthene	4	10	ug/L
EPA 3520C/8270C	Water	Acenaphthylene	3.1	10	ug/L
EPA 3520C/8270C	Water	Anthracene	3.7	10	ug/L
EPA 3520C/8270C	Water	Benzo(a)anthracene	3.5	10	ug/L
EPA 3520C/8270C	Water	Benzo(a)pyrene	3.1	10	ug/L
EPA 3520C/8270C	Water	Benzo(b)fluoranthene	5.4	10	ug/L
EPA 3520C/8270C	Water	Benzo(g,h,i)perylene	2.8	10	ug/L
EPA 3520C/8270C	Water	Benzo(k)fluoranthene	4.7	10	ug/L
EPA 3520C/8270C	Water	Benzoic acid	5.3	50	ug/L
EPA 3520C/8270C	Water	Benzyl alcohol	3.5	20	ug/L
EPA 3520C/8270C	Water	bis(2-Chloroethoxy)methane	3.8	10	ug/L
EPA 3520C/8270C	Water	bis(2-Chloroethyl) ether	2.2	10	ug/L
EPA 3520C/8270C	Water	bis(2-Chloroisopropyl) ether	3.3	10	ug/L
EPA 3520C/8270C	Water	bis(2-Ethylhexyl)phthalate	6.7	10	ug/L
EPA 3520C/8270C	Water	Butylbenzylphthalate	3.3	10	ug/L
EPA 3520C/8270C	Water	Carbazole	3	10	ug/L
EPA 3520C/8270C	Water	Chrysene	3.9	10	ug/L
EPA 3520C/8270C	Water	Dibenz(a,h)anthracene	3.6	10	ug/L
EPA 3520C/8270C	Water	Dibenzofuran	4	10	ug/L
EPA 3520C/8270C	Water	Diethylphthalate	3.7	10	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 3520C/8270C	Water	Dimethylphthalate	3.7	10	ug/L
EPA 3520C/8270C	Water	Di-n-butylphthalate	3.7	10	ug/L
EPA 3520C/8270C	Water	Di-n-octylphthalate	3.5	10	ug/L
EPA 3520C/8270C	Water	Fluoranthene	3.5	10	ug/L
EPA 3520C/8270C	Water	Fluorene	3.6	10	ug/L
EPA 3520C/8270C	Water	Hexachloro-1,3-butadiene	3.6	10	ug/L
EPA 3520C/8270C	Water	Hexachlorobenzene	3.6	10	ug/L
EPA 3520C/8270C	Water	Hexachlorocyclopentadiene	1.5	10	ug/L
EPA 3520C/8270C	Water	Hexachloroethane	3.7	10	ug/L
EPA 3520C/8270C	Water	Indeno(1,2,3-cd)pyrene	3.3	10	ug/L
EPA 3520C/8270C	Water	Isophorone	3.8	10	ug/L
EPA 3520C/8270C	Water	Naphthalene	3.3	10	ug/L
EPA 3520C/8270C	Water	Nitrobenzene	3.8	10	ug/L
EPA 3520C/8270C	Water	N-Nitroso-di-n-propylamine	3.9	10	ug/L
EPA 3520C/8270C	Water	N-Nitrosodiphenylamine	3.7	10	ug/L
EPA 3520C/8270C	Water	Pentachlorophenol	4.5	50	ug/L
EPA 3520C/8270C	Water	Phenanthrene	3.4	10	ug/L
EPA 3520C/8270C	Water	Phenol	2.2	10	ug/L
EPA 3520C/8270C	Water	Pyrene	3.8	10	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 5035/8260B	Solid	1,1-Dichloroethane	0.58	5	ug/kg
EPA 5035/8260B	Solid	1,1-Dichloroethene	0.94	5	ug/kg
EPA 5035/8260B	Solid	1,1-Dichloropropene	1.17	5	ug/kg
EPA 5035/8260B	Solid	1,1,1-Trichloroethane	0.6	5	ug/kg
EPA 5035/8260B	Solid	1,1,2-Trichloroethane	1.42	5	ug/kg
EPA 5035/8260B	Solid	1,1,1,2-Tetrachloroethane	0.95	5	ug/kg
EPA 5035/8260B	Solid	1,1,2,2-Tetrachloroethane	2.8	5	ug/kg
EPA 5035/8260B	Solid	1,2,4-Trichlorobenzene	1.9	5	ug/kg
EPA 5035/8260B	Solid	1,2-Dichlorobenzene	1.13	5	ug/kg
EPA 5035/8260B	Solid	1,2-Dibromo-3-chloropropane	4.86	5	ug/kg
EPA 5035/8260B	Solid	1,2-Dichloroethane	1.54	5	ug/kg
EPA 5035/8260B	Solid	1,2-Dibromoethane (EDB)	1.22	5	ug/kg
EPA 5035/8260B	Solid	1,2-Dichloropropane	1.05	5	ug/kg
EPA 5035/8260B	Solid	1,2-Dichloroethane (Total)	0.82	5	ug/kg
EPA 5035/8260B	Solid	1,2,4-Trimethylbenzene	0.59	5	ug/kg
EPA 5035/8260B	Solid	1,2,3-Trichlorobenzene	0.76	5	ug/kg
EPA 5035/8260B	Solid	1,2,3-Trichloropropane	3.44	5	ug/kg
EPA 5035/8260B	Solid	1,3-Dichlorobenzene	0.19	5	ug/kg
EPA 5035/8260B	Solid	1,3-Dichloropropane	1.55	5	ug/kg
EPA 5035/8260B	Solid	1,3,5-Trimethylbenzene	0.47	5	ug/kg
EPA 5035/8260B	Solid	1,4-Dichlorobenzene	0.27	5	ug/kg
EPA 5035/8260B	Solid	1-Chlorohexane	1.78	5	ug/kg
EPA 5035/8260B	Solid	2,2-Dichloropropane	0.88	5	ug/kg
EPA 5035/8260B	Solid	2-Butanone (MEK)	10	10	ug/kg
EPA 5035/8260B	Solid	2-Chlorotoluene	0.18	5	ug/kg
EPA 5035/8260B	Solid	2-Chloroethylvinyl ether	1.71	5	ug/kg
EPA 5035/8260B	Solid	2-Hexanone	5.55	100	ug/kg
EPA 5035/8260B	Solid	4-Chlorotoluene	0.3	5	ug/kg
EPA 5035/8260B	Solid	Carbon disulfide	0.61	10	ug/kg
EPA 5035/8260B	Solid	Acetone	14.3	20	ug/kg
EPA 5035/8260B	Solid	Acrolein	61	100	ug/kg
EPA 5035/8260B	Solid	Acrylonitrile	23.9	100	ug/kg
EPA 5035/8260B	Solid	Bromochloromethane	1.56	5	ug/kg
EPA 5035/8260B	Solid	Benzene	0.5	5	ug/kg
EPA 5035/8260B	Solid	Bromobenzene	0.34	5	ug/kg
EPA 5035/8260B	Solid	Bromodichloromethane	1.05	5	ug/kg
EPA 5035/8260B	Solid	Bromomethane	2.4	5	ug/kg
EPA 5035/8260B	Solid	Bromoform	1.47	5	ug/kg
EPA 5035/8260B	Solid	cis-1,2-Dichloroethene	0.75	5	ug/kg
EPA 5035/8260B	Solid	cis-1,3-Dichloropropene	0.64	5	ug/kg
EPA 5035/8260B	Solid	Carbon tetrachloride	0.85	5	ug/kg
EPA 5035/8260B	Solid	Chlorobenzene	0.15	5	ug/kg
EPA 5035/8260B	Solid	Chloroethane	0.55	5	ug/kg
EPA 5035/8260B	Solid	Chloroform	0.67	5	ug/kg
EPA 5035/8260B	Solid	Chloromethane	0.32	5	ug/kg
EPA 5035/8260B	Solid	Dibromochloromethane	1.03	5	ug/kg
EPA 5035/8260B	Solid	Dichlorodifluoromethane	1.86	5	ug/kg
EPA 5035/8260B	Solid	Dibromomethane	1.85	5	ug/kg

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 5035/8260B	Solid	Ethylbenzene	1.21	5	ug/kg
EPA 5035/8260B	Solid	Hexachloro-1,3-butadiene	1.97	5	ug/kg
EPA 5035/8260B	Solid	Isopropylbenzene (Cumene)	0.67	5	ug/kg
EPA 5035/8260B	Solid	Methylene chloride	2.3	5	ug/kg
EPA 5035/8260B	Solid	Methyl-tert-butyl ether	1.56	5	ug/kg
EPA 5035/8260B	Solid	4-Methyl-2-pentanone (MIBK)	4.31	10	ug/kg
EPA 5035/8260B	Solid	m&p-Xylene	1.98	5	ug/kg
EPA 5035/8260B	Solid	o-Xylene	0.44	5	ug/kg
EPA 5035/8260B	Solid	Xylene (Total)	2.35	5	ug/kg
EPA 5035/8260B	Solid	Naphthalene	2.19	10	ug/kg
EPA 5035/8260B	Solid	n-Butylbenzene	1.29	5	ug/kg
EPA 5035/8260B	Solid	n-Propylbenzene	0.57	5	ug/kg
EPA 5035/8260B	Solid	p-Isopropyltoluene	0.46	5	ug/kg
EPA 5035/8260B	Solid	sec-Butylbenzene	0.2	5	ug/kg
EPA 5035/8260B	Solid	Styrene	1.15	5	ug/kg
EPA 5035/8260B	Solid	trans-1,2-Dichloroethene	0.46	5	ug/kg
EPA 5035/8260B	Solid	trans-1,3-Dichloropropene	0.52	5	ug/kg
EPA 5035/8260B	Solid	Tetrachloroethene	1.27	5	ug/kg
EPA 5035/8260B	Solid	Toluene	0.66	5	ug/kg
EPA 5035/8260B	Solid	Trichloroethene	0.36	5	ug/kg
EPA 5035/8260B	Solid	Trichlorofluoromethane	0.93	5	ug/kg
EPA 5035/8260B	Solid	tert-Butylbenzene	0.97	5	ug/kg
EPA 5035/8260B	Solid	Vinyl acetate	2.29	100	ug/kg
EPA 5035/8260B	Solid	Vinyl chloride	0.67	5	ug/kg

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 8260B-Low Level	Water	1,1-Dichloroethane	0.26	1	ug/L
EPA 8260B-Low Level	Water	1,1-Dichloroethene	0.34	1	ug/L
EPA 8260B-Low Level	Water	1,1-Dichloropropene	0.35	1	ug/L
EPA 8260B-Low Level	Water	1,1,1-Trichloroethane	0.31	1	ug/L
EPA 8260B-Low Level	Water	1,1,2-Trichloroethane	0.29	1	ug/L
EPA 8260B-Low Level	Water	1,1,1,2-Tetrachloroethane	0.27	1	ug/L
EPA 8260B-Low Level	Water	1,1,2,2-Tetrachloroethane	0.2	1	ug/L
EPA 8260B-Low Level	Water	1,2,4-Trichlorobenzene	0.18	1	ug/L
EPA 8260B-Low Level	Water	1,2-Dichlorobenzene	0.16	1	ug/L
EPA 8260B-Low Level	Water	1,2-Dibromo-3-chloropropane	0.24	2.5	ug/L
EPA 8260B-Low Level	Water	1,2-Dichloroethane	0.32	1	ug/L
EPA 8260B-Low Level	Water	1,2-Dibromoethane (EDB)	0.31	1	ug/L
EPA 8260B-Low Level	Water	1,2-Dichloropropane	0.32	1	ug/L
EPA 8260B-Low Level	Water	1,2-Dichloroethene (Total)	0.6	1	ug/L
EPA 8260B-Low Level	Water	1,2,4-Trimethylbenzene	0.19	1	ug/L
EPA 8260B-Low Level	Water	1,2,3-Trichlorobenzene	0.17	1	ug/L
EPA 8260B-Low Level	Water	1,2,3-Trichloropropane	0.3	2.5	ug/L
EPA 8260B-Low Level	Water	1,3-Dichlorobenzene	0.19	1	ug/L
EPA 8260B-Low Level	Water	1,3-Dichloropropane	0.29	1	ug/L
EPA 8260B-Low Level	Water	1,3,5-Trimethylbenzene	0.18	1	ug/L
EPA 8260B-Low Level	Water	1,4-Dichlorobenzene	0.17	1	ug/L
EPA 8260B-Low Level	Water	1-Chlorohexane	0.36	1	ug/L
EPA 8260B-Low Level	Water	2,2-Dichloropropane	0.33	1	ug/L
EPA 8260B-Low Level	Water	2-Butanone (MEK)	0.72	10	ug/L
EPA 8260B-Low Level	Water	2-Chlorotoluene	0.22	1	ug/L
EPA 8260B-Low Level	Water	2-Chloroethylvinyl ether	0.18	10	ug/L
EPA 8260B-Low Level	Water	2-Hexanone	0.69	10	ug/L
EPA 8260B-Low Level	Water	4-Chlorotoluene	0.19	1	ug/L
EPA 8260B-Low Level	Water	Carbon disulfide	0.24	5	ug/L
EPA 8260B-Low Level	Water	Acetone	1.09	10	ug/L
EPA 8260B-Low Level	Water	Acrolein	11	20	ug/L
EPA 8260B-Low Level	Water	Acrylonitrile	2.73	20	ug/L
EPA 8260B-Low Level	Water	Bromochloromethane	0.33	1	ug/L
EPA 8260B-Low Level	Water	Benzene	0.34	1	ug/L
EPA 8260B-Low Level	Water	Bromobenzene	0.18	1	ug/L
EPA 8260B-Low Level	Water	Bromodichloromethane	0.28	1	ug/L
EPA 8260B-Low Level	Water	Bromomethane	0.38	1	ug/L
EPA 8260B-Low Level	Water	Bromoform	0.18	1	ug/L
EPA 8260B-Low Level	Water	cis-1,2-Dichloroethene	0.31	1	ug/L
EPA 8260B-Low Level	Water	cis-1,3-Dichloropropene	0.29	1	ug/L
EPA 8260B-Low Level	Water	Carbon tetrachloride	0.32	1	ug/L
EPA 8260B-Low Level	Water	Chlorobenzene	0.28	1	ug/L
EPA 8260B-Low Level	Water	Chloroethane	0.3	1	ug/L
EPA 8260B-Low Level	Water	Chloroform	0.35	1	ug/L
EPA 8260B-Low Level	Water	Chloromethane	0.29	1	ug/L
EPA 8260B-Low Level	Water	Dibromochloromethane	0.24	1	ug/L
EPA 8260B-Low Level	Water	Dichlorodifluoromethane	0.26	1	ug/L
EPA 8260B-Low Level	Water	Dibromomethane	0.36	1	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 8260B-Low Level	Water	Ethylbenzene	0.29	1	ug/L
EPA 8260B-Low Level	Water	Hexachloro-1,3-butadiene	0.19	1	ug/L
EPA 8260B-Low Level	Water	Isopropylbenzene (Cumene)	0.22	1	ug/L
EPA 8260B-Low Level	Water	Methylene chloride	0.12	1	ug/L
EPA 8260B-Low Level	Water	Methyl-tert-butyl ether	0.29	1	ug/L
EPA 8260B-Low Level	Water	4-Methyl-2-pentanone (MIBK)	0.6	10	ug/L
EPA 8260B-Low Level	Water	m&p-Xylene	0.57	1.3	ug/L
EPA 8260B-Low Level	Water	o-Xylene	0.28	1.1	ug/L
EPA 8260B-Low Level	Water	Xylene (Total)	0.86	3	ug/L
EPA 8260B-Low Level	Water	Naphthalene	0.22	1	ug/L
EPA 8260B-Low Level	Water	n-Butylbenzene	0.18	1	ug/L
EPA 8260B-Low Level	Water	n-Propylbenzene	0.18	1	ug/L
EPA 8260B-Low Level	Water	p-Isopropyltoluene	0.16	1	ug/L
EPA 8260B-Low Level	Water	sec-Butylbenzene	0.19	1	ug/L
EPA 8260B-Low Level	Water	Styrene	0.28	1	ug/L
EPA 8260B-Low Level	Water	trans-1,2-Dichloroethene	0.3	1	ug/L
EPA 8260B-Low Level	Water	trans-1,3-Dichloropropene	0.22	1	ug/L
EPA 8260B-Low Level	Water	Tetrachloroethene	0.31	1	ug/L
EPA 8260B-Low Level	Water	Toluene	0.29	1	ug/L
EPA 8260B-Low Level	Water	Trichloroethene	0.31	1	ug/L
EPA 8260B-Low Level	Water	Trichlorofluoromethane	0.31	1	ug/L
EPA 8260B-Low Level	Water	tert-Butylbenzene	0.22	1	ug/L
EPA 8260B-Low Level	Water	Vinyl acetate	0.41	20	ug/L
EPA 8260B-Low Level	Water	Vinyl chloride	0.32	1	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 6010B Trace	Solid	Silver	0.133	0.7	mg/kg
EPA 6010B Trace	Solid	Aluminum	1.9	7.5	mg/kg
EPA 6010B Trace	Solid	Arsenic	0.5	1	mg/kg
EPA 6010B Trace	Solid	Boron	1.29	10	mg/kg
EPA 6010B Trace	Solid	Barium	0.39	1	mg/kg
EPA 6010B Trace	Solid	Beryllium	0.0068	0.1	mg/kg
EPA 6010B Trace	Solid	Calcium	1.1	10	mg/kg
EPA 6010B Trace	Solid	Cadmium	0.073	0.5	mg/kg
EPA 6010B Trace	Solid	Cobalt	0.068	0.5	mg/kg
EPA 6010B Trace	Solid	Chromium	0.058	0.5	mg/kg
EPA 6010B Trace	Solid	Copper	0.154	1	mg/kg
EPA 6010B Trace	Solid	Iron	0.502	5	mg/kg
EPA 6010B Trace	Solid	Potassium	8.3	50	mg/kg
EPA 6010B Trace	Solid	Lithium	0.39	5	mg/kg
EPA 6010B Trace	Solid	Magnesium	1.6	5	mg/kg
EPA 6010B Trace	Solid	Manganese	0.019	0.5	mg/kg
EPA 6010B Trace	Solid	Molybdenum	0.118	2	mg/kg
EPA 6010B Trace	Solid	Sodium	1.6	15	mg/kg
EPA 6010B Trace	Solid	Nickel	0.053	0.5	mg/kg
EPA 6010B Trace	Solid	Lead	0.22	0.5	mg/kg
EPA 6010B Trace	Solid	Antimony	0.4	1	mg/kg
EPA 6010B Trace	Solid	Selenium	0.67	1.5	mg/kg
EPA 6010B Trace	Solid	Silicon	0.317	50	mg/kg
EPA 6010B Trace	Solid	Tin	1.24	5	mg/kg
EPA 6010B Trace	Solid	Strontium	0.054	1	mg/kg
EPA 6010B Trace	Solid	Titanium	0.318	1	mg/kg
EPA 6010B Trace	Solid	Thallium	0.82	2	mg/kg
EPA 6010B Trace	Solid	Vanadium	0.21	1	mg/kg
EPA 6010B Trace	Solid	Zinc	0.266	10	mg/kg
EPA 6010B Trace	Water	Silver	1.6	7	ug/L
EPA 6010B Trace	Water	Aluminum	27.6	75	ug/L
EPA 6010B Trace	Water	Arsenic	2.4	10	ug/L
EPA 6010B Trace	Water	Boron	11.6	100	ug/L
EPA 6010B Trace	Water	Barium	2.6	10	ug/L
EPA 6010B Trace	Water	Beryllium	0.028	1	ug/L
EPA 6010B Trace	Water	Calcium	14.9	100	ug/L
EPA 6010B Trace	Water	Cadmium	0.59	5	ug/L
EPA 6010B Trace	Water	Cobalt	0.51	5	ug/L
EPA 6010B Trace	Water	Chromium	0.34	5	ug/L
EPA 6010B Trace	Water	Copper	1.4	10	ug/L
EPA 6010B Trace	Water	Iron	13.2	50	ug/L
EPA 6010B Trace	Water	Potassium	41.8	500	ug/L
EPA 6010B Trace	Water	Lithium	3.5	50	ug/L
EPA 6010B Trace	Water	Magnesium	11.8	50	ug/L
EPA 6010B Trace	Water	Manganese	0.56	5	ug/L
EPA 6010B Trace	Water	Molybdenum	1.4	20	ug/L
EPA 6010B Trace	Water	Sodium	26.2	150	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 6010B Trace	Water	Nickel	0.68	5	ug/L
EPA 6010B Trace	Water	Lead	2	5	ug/L
EPA 6010B Trace	Water	Antimony	2.5	10	ug/L
EPA 6010B Trace	Water	Selenium	5.3	15	ug/L
EPA 6010B Trace	Water	Silicon	5.3	500	ug/L
EPA 6010B Trace	Water	Tin	9	50	ug/L
EPA 6010B Trace	Water	Strontium	0.26	10	ug/L
EPA 6010B Trace	Water	Titanium	2.1	10	ug/L
EPA 6010B Trace	Water	Thallium	3.4	10	ug/L
EPA 6010B Trace	Water	Vanadium	2.1	10	ug/L
EPA 6010B Trace	Water	Zinc	1.4	100	ug/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	MDL	RL	Units
EPA 300.0	Water	Sulfate	0.27	1	mg/L
EPA 310.1	Water	Alkalinity, Bicarbonate (CaCO ₃)	1.6	20	mg/L
EPA 310.1	Water	Alkalinity, Carbonate (CaCO ₃)	1.6	20	mg/L
EPA 310.1	Water	Alkalinity, Hydroxide (CaCO ₃)	1.6	20	mg/L
EPA 310.1	Water	Alkalinity, Total	1.6	20	mg/L
EPA 335.3	Water	Cyanide	0.0015	0.005	mg/L
EPA 350.1	Water	Nitrogen, Ammonia	0.007	0.2	mg/L
EPA 351.2	Water	Nitrogen, Kjeldahl, Total	0.15	0.2	mg/L
EPA 353.2	Water	Nitrogen, NO ₂ plus NO ₃	0.09	0.5	mg/L
EPA 376.1	Water	Sulfide	0.28	0.5	mg/L
Chap 7, Sec 7.3	Solid	Cyanide, Reactive	0.22	0.5	mg/kg
Chap 7, Sec 7.3	Solid	Sulfide, Reactive	1.4	10	mg/kg
Chap 7, Sec 7.3	Water	Sulfide, Reactive	0.14	0.5	mg/L
EPA 9010B	Water	Cyanide	0.002	0.005	mg/L
EPA 9010B	Solid	Cyanide	0.05	0.05	mg/kg
EPA 9012A	Water	Cyanide	0.002	0.005	mg/L

Minimum Reporting Limits

Method	Matrix	Parameter Name	PRL	Units
SW-846 3810 (Modified)	Water	Methane	10	ug/L
SW-846 3810 (Modified)	Water	Ethane	20	ug/L
SW-846 3810 (Modified)	Water	Ethene	20	ug/L

Attachment B
Sample Container, Preservation, and Holding Time Requirements

Soil Parameters	Analytical Method	Container	Preservative	Holding Time
BTEXs	SW-846 8021B	4 oz glass soil jar	Cool 4 degrees C	14 days
VOCs	SW-846 8260	4 oz glass soil jar	Cool 4 degrees C	14 days
PAHs	SW-846 8270C SIM	4 oz glass soil jar	Cool 4 degrees C	14 days
SVOCs	SW-846 8270C	4 oz glass soil jar	Cool 4 degrees C	14 days
Total Metals	SW-846 6010B	4 oz glass soil jar	Cool 4 degrees C	6 months
Cyanide	SW-846 9010	4 oz glass soil jar	Cool 4 degrees C	14 days
RCRA HWC	SW-846 7.3/1010/9045	4 oz glass soil jar	Cool 4 degrees C	NA

Water Parameters	Analytical Method	Container	Preservative	Holding Time
BTEXs	SW-846 8021B	3 40 mL Purge Vials	HCL, Cool 4 degrees C	14 days
VOCs	SW-846 8260B	3 40 mL Purge Vials	HCL, Cool 4 degrees C	14 days
PAHs	SW-846 8270C SIM	1 L Amber Glass	Cool 4 degrees C	7 days
SVOCs	SW-846 8270C	1 L Amber Glass	Cool 4 degrees C	7 days
Total Metals	SW-846 6010B	1 plastic pint	HNO ₃ , Cool 4 degrees C	6 months
Filtered Dissolved Metals	SW-846 6010B	1 plastic pint	HNO ₃ , Cool 4 degrees C	6 months
Unfiltered Dissolved Metals	SW-846 6010B	1 plastic pint	Cool 4 degrees C	14 days
Cyanide	SM 4500 CN EPA 335.3	1 plastic 250 mL	NaOH, Cool 4 degrees C	14 days
Methane	EPA 3810	3 40 mL Purge Vials	HCL, Cool 4 degrees C	14 days
Carbon Dioxide	SM4500-CO2 D	1 plastic pint	Cool 4 degrees C	14 days
Alkalinity	EPA 310.1	1 plastic pint	Cool 4 degrees C	14 days
Ammonia	EPA 350.1	1 plastic pint	H ₂ SO ₄ , Cool 4 degrees C	28 days
TKN	EPA 351.2	1 plastic pint	H ₂ SO ₄ , Cool 4 degrees C	28 days
Nitrate + Nitrite	EPA 353.2	1 plastic pint	H ₂ SO ₄ , Cool 4 degrees C	28 days
Sulfate	EPA 300.0	1 plastic pint	Cool 4 degrees C	28 days
Sulfide	EPA 376.1	1 plastic pint	NaOH + Zinc Acetate, Cool 4 degrees C	7 days

Attachment 3

Additional Reference Documents

“Compendiums of the Environmental Response Team’s (ERT) Standard Operating Procedures (SOPs) for Sampling and Analytical Protocols”, January 1991, OSWER Directives Nos. 9360.4-02, 9360.4-03, 9360.4-05, 9360.4-06, 9360.4-07, and 9360.4-08.

“Removal Program, Representative Sampling Guidance”, November 1991, OSWER Directive No. 9360.4-10.

“Data Quality Objectives for the Superfund Process”, September 1993, OSWER Directive No. 9355.9-01.

“EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations”, October 1997, U.S. EPA, Quality Assurance Division, EPA QA/R-5.

“Quality Assurance/Quality Control Guidance for Removal Activities, Sampling QA/QC Plan and Data Validation Procedures”, April 1990, OSWER Directive No. 9360.4-01.

“USEPA Contract Laboratory Program Statement of Work for Organic Analysis”, August 1994, OLM03.1, EPA 540/R-94/073.

“National Oil and Hazardous Substances Contingency Plan: Final Rule”, Vol. 55, No. 46 Fed Reg. 8666 (March 8, 1990).

IN THE MATTER OF Columbus Former Manufactured Gas Plant Site, Columbus, Nebraska; Centel Corporation and Aquila, Inc., Respondents
Docket No. CERCLA-07-2003-0307

CERTIFICATE OF SERVICE

I certify that the foregoing Administrative Order on Consent for Removal Site Evaluation for the Source of Contamination and Baseline Risk Management was sent this day in the following manner to the addressees:

Copy hand delivered to
Attorney for Complainant:

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Assistant Regional Counsel
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Dated: 11/14/04


Kathy Robinson
Regional Hearing Clerk